THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

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GAS PURIFICATION
BY
OXIDE OF IRON.

COOKE BROS.,
CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
BLACKWALL, E.;
OFFICES:
26, 27, & 28, FENCHURCH ST.,
LONDON, E.C.

GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
Several Prize Medals. Established over 20 Years.
These Paints are now used in over 200 Country Gas-Works, and by all the London Gas Companies, on Gas-holders, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov. 2, 1866.*
Supplied, mixed ready for use, or in paste, as desired.
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Proprietors: STEVENS & CO.,
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Works: BRIXHAM, TORBAY.

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BROOKFIELD GAS APPARATUS WORKS,
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CONTRACTOR FOR
LAYING MAINS
FOR
Gas, Water, & Sanitary Purposes,
AND MANUFACTURER OF
WOOD GRIDS
FOR
SCRUBBERS AND PURIFIERS.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

JOHN RUSSELL & CO.,
LIMITED,
Established at the commencement of Gas Lighting,
Manufacturers of
TUBES AND FITTINGS.
THREE PRIZE MEDALS,
Paris, 1878.
Head London Office:
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ALMA TUBE-WORKS, WALSALL;
OLD PATENT TUBE-WORKS, WEDNESBURY.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
Manufacturers of
WET AND DRY GAS-METERS,
Licensees and Manufacturers of
HUNT'S
PATENT COMPENSATING METERS,
STREET-LAMPS, &c., &c.
Established 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM,
Manufacturers of
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
Sugar, Saltpetre, and all kinds of Pans.
Roofs, Girders, and Bridges, and General Smith's Work.
London Offices: 97, CANNON STREET—
JAMES E. & SAMUEL SPENCER, Agents.

THE
"OTTO" GAS-ENGINE.
See Page 390.

CROSSLEY BROTHERS,
MANCHESTER AND LONDON.

THE
NITSHILL COMPANY'S
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
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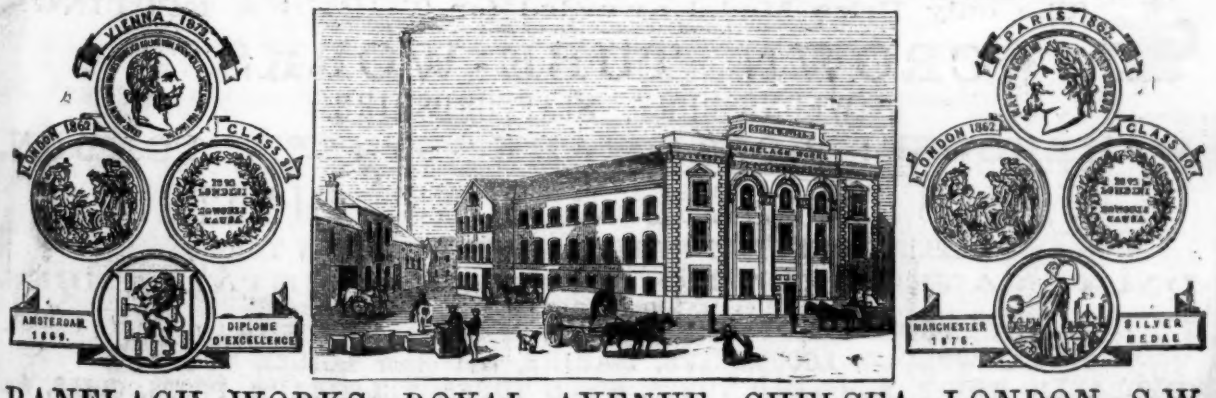
EDINBURGH.

CHANGE OF ADDRESS.

GEORGE GLOVER AND CO.,
DRY GAS-METER MANUFACTURERS,
HAVE REMOVED TO MORE EXTENSIVE PREMISES:



RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

AND

COOMBS WOOD TUBE-WORKS, HALESOWEN,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS,

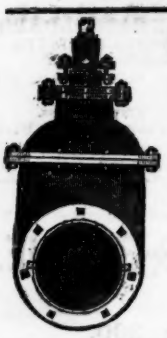
AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES,

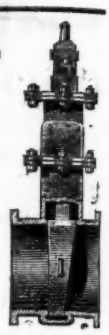
UP TO FOUR FEET IN DIAMETER.

London Offices: No. 4, Cloak Lane, Queen Street, E.C.

Warehouses: London, Liverpool, Manchester, and Lille.



C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves have taken the place of the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

MIDLAND IRON-WORKS,

DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

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ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

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GAS APPARATUS;

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Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

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THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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WAREHOUSE: SOUTHWARK STREET, LONDON.

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ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

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TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

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PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

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MESSRS. SPENCE BROS., LIMITED,

Will be glad to supply the above on the most favourable terms, and to treat, by Purchase or Exchange, for Spent Oxide.

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ALSO PATENT DRY COPPERAS FOR EXTRACTING AMMONIA.

VICTORIA CHEMICAL WORKS, BRADFORD, NEAR MANCHESTER.

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MANUFACTURER OF

TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST-IRON TANKS FOR DITTO.

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, AND ALL KINDS OF GAS APPARATUS.

WROUGHT-IRON ROOFS, BRIDGES, GIRDERS, ETC.

STEAM, HOT WATER, AND RANGE BOILERS, TANKS, CISTERNS, BOATS,

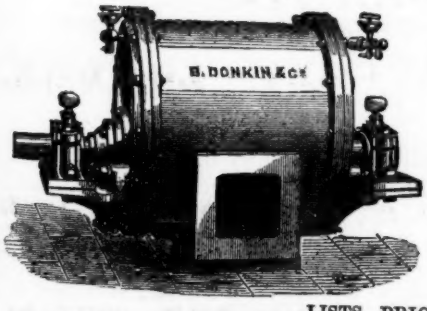
AND ALL KINDS OF WROUGHT-IRON WORK.

Drawings, Specifications, and Estimates supplied on application.

J. BEALE'S NEW PATENT GAS EXHAUSTERS

MANUFACTURED SOLELY BY

B. DONKIN & Co.



These Exhausters have but one solid slide, which ensures less wear and friction, and thus fewer repairs are necessary. They are made with two outside bearings and with all latest improvements.

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STEAM-ENGINES FOR DRIVING GAS EXHAUSTERS.
IMPROVED GAS-VALVES.
VALVES FOR AMMONIACAL LIQUOR, TAR, and HYDRAULIC MAINS,
VALVES FOR SPECIAL PURPOSES, WITH COLUMNS, SCALES, AND GAUGES.
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TORBAY IRON PAINTS.

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These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Wagon Works, and the Paint Trade generally. They are the BEST PROTECTORS of WOOD, CEMENT, and IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to iron. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only to be thinned down for use in the ordinary way—are kept in stock:—

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Dart Green.	Slate.
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Brixham Black.	Torbay Chocolate.
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Bronze Green.	Salmon Colour.
Navy Green.	Lead Colour.
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All other Colours made to order.

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A great variety of Colours ready mixed for the brush are also always kept in Stock, in 3 lb., 7 lb., 14 lb., and 28 lb. cans.

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WROUGHT-IRON TUBES AND FITTINGS
FOR GAS, STEAM, AND WATER.
Hot Water Tubes, Core Bars, Lap-welded Iron Boiler Tubes.
CAST-IRON PIPES for GAS & WATER.
Brass and Gun-Metal Fittings, Valves, Cutting and Screwing Tools, &c.

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MANUFACTURER OF
SQUARE STATION-METERS, with PLANED JOINTS;
ROUND STATION-METERS, WITH CAST-IRON STANDS;
WET AND DRY CONSUMERS GAS-METERS, GOVERNORS, &c.

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CONTRACTORS FOR GAS & WATER WORKS, GENERAL ENGINEERS, IRONFOUNDERS & MANUFACTURERS OF
GASHOLDERS, TANKS, PURIFIERS,
SCRUBBERS, VALVES, EXHAUSTERS, IRON ROOFS, BRIDGES, BOILERS, AND GENERAL CAST AND WROUGHT IRON WORKS.

S. C. & SONS undertake the entire erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the supplying and laying of MAINS.
They make a speciality of supplying every requisite whatever for Gas-Works, keeping in Stock what are most in request. WOOD SIEVES for Purifiers and Scrubbers, of a superior make.
SPECIAL CASTINGS to Drawing or Pattern at Shortest Notice.

Manufacturers of MORRIS & CUTLER'S PATENT CONDENSER & CUTLER'S PATENT GAS-WASHER.

DESCRIPTION OF MORRIS & CUTLER'S PATENT CONDENSER.—The Condenser may consist of pipes arranged in tiers, or in any other form most convenient to the site available, each tier being connected with special connections, and containing within same either one or more coils of smaller pipe through which water is passed, being supplied from any convenient source of supply, the water passing in an opposite direction to the gas, so that the coldest water is at the gas outlet. The power of the Condenser can be regulated precisely in proportion to the quantity of water allowed to pass through, which is not in any way contaminated, but simply heated by the hot gas, and advantage can be taken of its being at a high level to carry it to a high-level cistern, from whence it can be used for supply to boiler or any other purpose. The Condenser itself may form the support for a high-level cistern. By an arrangement of valves the water may be shut off, and an air orifice opened, when air will pass through instead of water, or both air and water can be shut off. The power of the Condenser is, therefore, entirely under control. The Condenser may be seen in operation at the Brentford Gas-Works.

For further Particulars, apply to Mr. F. MORRIS, GAS-WORKS, BRENTFORD, or to
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STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

JAMES MILNE & SON,

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Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

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STATION-METERS GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

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J. & J. BRADDOCK,

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MANUFACTURERS OF

WET & DRY CONSUMERS GAS-METERS,

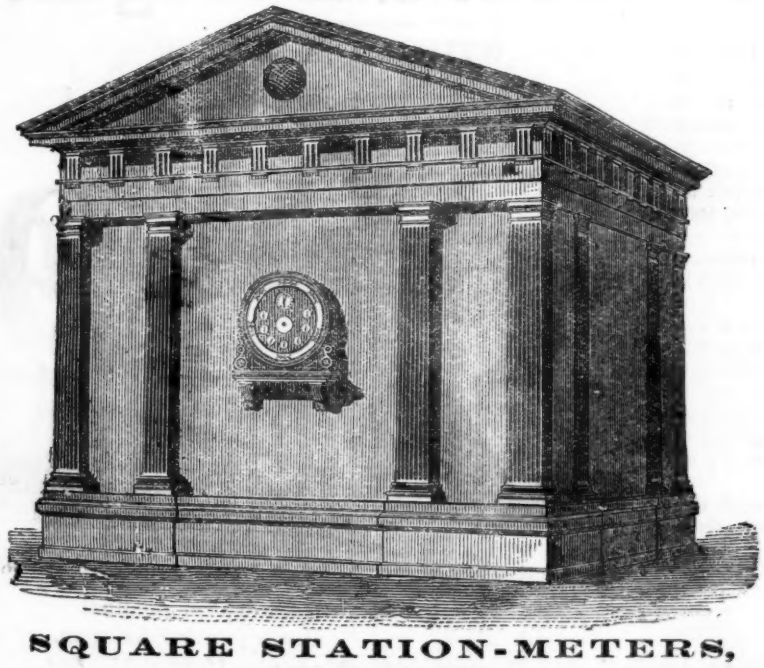
OF THE HIGHEST EXCELLENCE ONLY;

ALSO LICENSEES AND MANUFACTURERS OF

WARNER & COWAN'S PATENT SELF-REGULATING GAS-METERS;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

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WOOD PURIFIER SIEVES,

Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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ESTABLISHED IN 1860.

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THE ORIGINAL MANUFACTURER OF THE IMPROVED

WOOD SIEVES

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GAS PURIFIERS & SCRUBBERS.

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FIRE CLAY and BRICK WORKS,

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Proprietors of

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Manufacturers for Home and Export.

GAS-RETORTS, GLASS-HOUSE FURNACE,

BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,

And Every Description of Best Fire-Bricks.

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AND

CANNEL COAL FACTOR,

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Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

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Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTER-MIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

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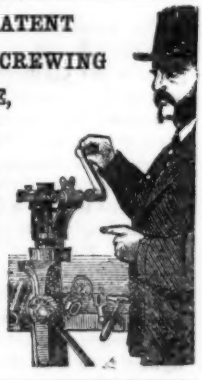
PORTABLE PIPE SCREWING MACHINE,



For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great a tisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

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Brassfounders, Gauge Injector and Tool Makers,

ALBION WORKS, SALFORD,

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Gold Medal Awarded, Paris Exhibition, 1878.

THOMAS TURTON AND SONS,

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MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS,

STEEL OF ALL DESCRIPTIONS,

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The only Gold Medal awarded for "Apparatus and Processes for Heating and Lighting" by the Imperial Commissioners.

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GOLD MEDAL (Rappel) for Metallic Bedsteads and Furniture.

GOLD MEDAL (Rappel) for Art Metal Work. BRONZE MEDAL for Tube Metal and Wire.

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BRACKETS FOR HEATING AND LIGHTING;

METALLIC BEDSTEADS.

Ecclesiastical and Mediæval Metal Workers.

GENERAL BRASSFOUNDERS.

REGISTERED TRADE MARK:

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THE

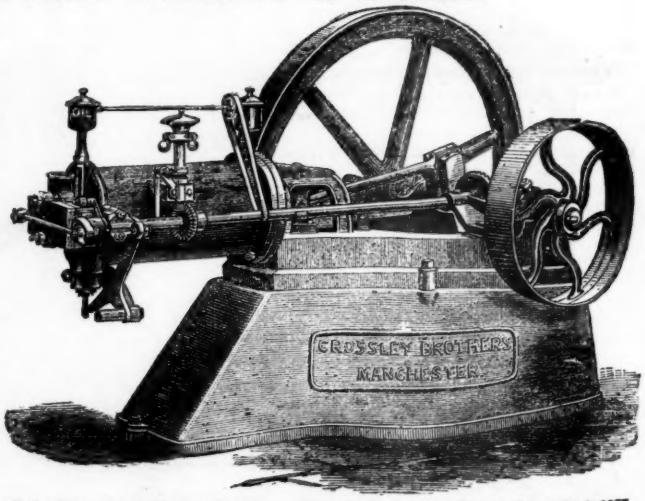
New "OTTO" Silent Gas-Engine.

AN ENGINE WHICH WORKS WITHOUT A BOILER.

The principle of combustion in this Gas-Engine is ENTIRELY NEW. In it an explosion does not take place in the ordinary meaning of the term. A small part only of the charge is combustible, which on ignition serves to expand the remainder, thus avoiding shock and effecting great economy. The Engine is also alone in the peculiarity of igniting its charge at the *beginning* of the stroke, leaving the whole of the stroke for effecting expansion of the gases, instead of merely a fraction as in obsolete constructions.

This Engine has a SMALLER NUMBER of MOVING PARTS than any other Gas-Engine; or, indeed, than many steam-engines. It is almost as silent as a steam-engine, works with the same smoothness and regularity of speed, and has the immense additional advantages of always being ready to start at full power at once on the gas being lighted; and, by dispensing with the boiler, of avoiding the danger of explosion, increased rates for insurance, expensive attendance, and all the annoyance which the use of a boiler entails.

Where work is intermittent, trouble with a small steam-engine and boiler is at its maximum, but at its minimum with a Gas-Engine.



Cut of 3½ Horse-Power Engine. Otto & Crossley's Patents, 1876 & 1877

Sizes at present offered . . . . . 1, 2, 3½, and 8 Horse-power nominal.
Being equal to about . . . . . 1½, 2½, 4, and 12 Horse-power maximum.

Cost of Gas, One Penny per hour per indicated Horse-power, at 4s. per 1000 cubic feet.

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SOLE ENGLISH AND COLONIAL MAKERS.

TANGYE BROTHERS AND HOLMAN,

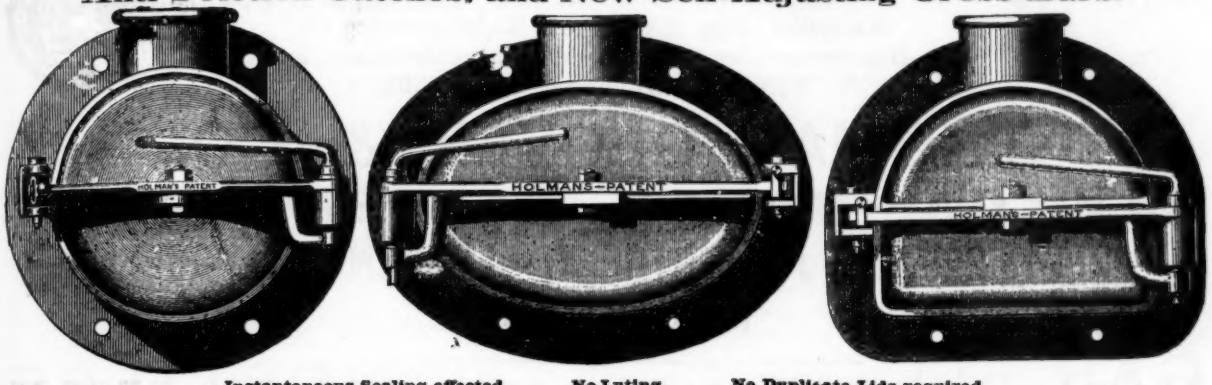
CORNWALL HOUSE, 35, QUEEN VICTORIA STREET, LONDON, E.C.,

(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.
Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1878.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

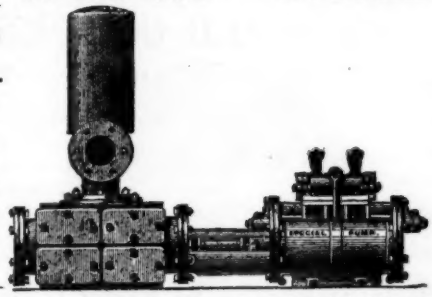
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-pieces between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851 New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

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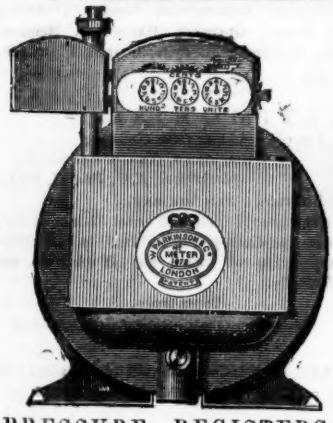
THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS.

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816,)

MANUFACTURERS OF

WET & DRY METERS,

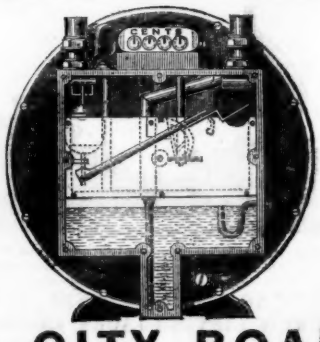
STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 18, 1879.

Circular to Gas Companies.

The Bill promoted by The Gaslight and Coke Company, which will presently be before a Committee of the House of Commons, is, we understand, to encounter the strong opposition of the Corporation of the City of London and the Metropolitan Board of Works. The chief ground of opposition is what are called the inquisitorial powers asked for by the Company in section 4 of the Bill. We have so often contended that a Gas Company should have the power of following gas from the main to the burner, that it is hardly necessary to add here to the arguments we have already adduced. Gas Companies are continually complained of for supplying "bad" gas, are accused of sending gas with a large mixture of air, and are exposed to sundry other absurd accusations. Most of these flow from a very simple source. It is imperfect fittings which consumers have put into their houses. They are, of course, at the mercy of gas-fitters, who seldom have any scientific knowledge of their business. These latter are told to put up a certain number of lights, and to make certain connections, and they do this without the smallest consideration of the relation between the two. They do not, for instance, understand that twelve or twenty lights will require a composition pipe of larger diameter than will be required for six lights. Hence it is perfectly right that Gas Companies should have access to consumers premises, in order that they may ascertain whether or not the fittings are adapted to the consumers wants, and whether or not they are kept in proper order. These powers are just such as would have been applied for by either of the Authorities we have named if they had a gas undertaking to manage. So much opposition does not seem to be manifested against the provisions of section 3, which is to give the Company power to engage in the manufacture of all kinds of fittings and appliances for "the consumption of gas, or any product derived therefrom." A suspicion appears to be entertained that the Company may, by their procedure, make large profits, and it does not seem to be understood that all the pecuniary advantage realized by this new branch of industry will go into the common fund of the Company, and, if a profit be made, must necessarily tend to a reduction in the price of gas.

On Tuesday evening, Mr. Raikes supported the second reading of the Liverpool Lighting Bill, and, subsequently, proposed the appointment of a hybrid Committee, in accordance with the notice which we published in our last. No subject with which we have ever been acquainted has come before Parliament in so immature a state for legislation as the question of the sanction to be given to lighting by electricity. Mr. Raikes may refer, if he chooses, to the chaotic legislation, as regarded the supply of gas, between the years 1810 and 1847. But that chaos was nothing compared with what exists to-day in regard to the supply of the electric light. Gas lighting sprang into existence "consummate "in its birth," as Minerva sprang from the cleft cranium of Jupiter. The whole thing was, as we may say, in a nutshell, and coals were distilled, and gas was produced, at a cost which was easily ascertainable, and all Parliament had to do, in the early days of gas lighting, was to sanction the distribution of it. Rival interests, it is true, in the course of years, caused a chaotic state of affairs in the Metropolis, which was only brought into order by the Act of 1860; and in the Provinces no difficulties, so far as we know, have ever been experienced in regulating a supply of gas. To compare the present condition of the electric light with that of gas lighting when the Chartered Act of 1810 was passed, would be absurd. The former is still in the experimental stage, and is likely to remain there for a long time; the latter was a proved and undoubted success from the first. It had to encounter much opposition from men who ought to have known better than to set speculative science against accomplished facts; but gas lighting prevailed by virtue of the public benefit which it was at once recognized would result from its adoption. We cannot say that electric lighting to-day is entitled to be regarded with the same favour that gas lighting was in 1810. From the time that Pall Mall was first illuminated by gas—we might go farther back and say from the first time that Mr. Winsor lighted up the Lyceum Theatre—the manufacture and use of gas steadily spread over the whole Metropolis, and indeed over the whole of the country. Electricity has now received some extensive trials, and everywhere, except in lighthouses and a few private establishments, has been found to fail. That Gas Companies should have rushed in to endeavour to make profit out of an invention which people told them would prove their ruin, we are not at all surprised; and that Corporations should have followed the same course—always desiring the destruction of an industry which has conferred innumerable benefits on the community—is not to be wondered at. The object of the Liverpool Corporation, in promoting a measure which would empower them to furnish the electric light, is simply to cheapen the undertaking of the Liverpool United Gas Company, which they desire to purchase. The electric light is a sort of scooped turnip with a tallow dip inside, which the Liverpool Corporation are innocently holding up to frighten the Gas Company. We may cut the story short for the present, by wishing Mr. Raikes's hybrid Committee well out of their tribulation and anxieties. To suggest any legislation for the electric light at the present moment, will puzzle, we think, the wisest head Mr. Raikes has selected to take part in the deliberations of his Committee.

Colonel Haywood has presented to the Streets Committee of the Commissioners of Sewers for the City of London a report on the experiment in electric lighting on the Holborn Viaduct. From this we gather that the total cost to the Commission of the experiment, up to the 18th of February last, was £785; and, adding £90 for the remaining eighteen nights, we have a total of £875. The report goes on to make a comparison between the expense of the electric light and the cost for gas. We need not give the details, but will quote the summary. "Applying," says Colonel Haywood, "these rates to a whole year, electric lighting

"(on the Viaduct) would cost £3072, while the cost for gas "lighting would be only £419;" hence, at present charges, electric lighting is about seven-and-a-half times dearer than gas lighting. As to relative illuminating power we obtain no information; and, at present, none is to be procured of a reliable character. We ought to mention here, that it was found desirable to station on the Viaduct a gas-lamp lighter in case of the sudden extinction of the electric light. His services were only required on four occasions, but it must be borne in mind that on many evenings one or two electric lamps went out at a time.

Notwithstanding an admitted failure—not complete, it is true—the Metropolitan Board of Works have resolved to continue the light on the Victoria Embankment for another three months, the Société Générale d'Electricité having made a considerable reduction in their charges. It is hoped by the Board that some means may be found of so far reducing the cost of the light that it may compete with gas on equal terms. We do not think these expectations will be realized, although it is quite likely that some improvements will be made, which will lessen the cost. This reduction, however, is not all that is required; for we want the light improved—made more steady, more constant, and better diffused. Very few people are satisfied with the Jablochkoff light, which, no doubt, is capable of an improvement which it may possibly receive.

To dispose of the electric light for this week, we may just mention the fact, that—at all events for the present—it has been discontinued in the Reading Room of the British Museum. There appears to be a possibility that the experiments will be resumed during next winter, but of this we have no certain knowledge.

It appears to have leaked out that negotiations are in progress which we hope will result in the amalgamation of the Phœnix and Surrey Consumers Companies with the Chartered, and the Metropolitan Board of Works seem to be alarmed at the prospect. They have referred it to the Works and General Purposes Committee to obtain information on the matter—a step perfectly unnecessary, for as soon as a scheme is settled between the Companies, it will be submitted to the Board of Trade, who will immediately transmit it to the Metropolitan Board for their consideration. We regard this progressive work of amalgamation as eminently conducive to the interests of consumers, and therefore hope that no obstacles will be thrown in the way of its completion.

Further complaints are made to the Metropolitan Board of a deficiency in the illuminating power of the gas supplied from the Chartered Company's Kensal Green station; but the Chief Gas Examiner reports that there is no "statutory" evidence of the deficiency. It is, it seems, a question of the unequal consumption of candles. The Referees have fixed limits, and if these are exceeded, the Examiner is bound to reject the experiment. Now, it would appear that the Metropolitan Board are desirous of having these limits extended, so that no experiments may be rejected; and, perhaps, no harm would be done to anybody if the extension were allowed. The question is as broad as it is long. A sum in proportion gives a result which may or may not be strictly correct from a scientific point of view, but which, nevertheless, is sufficiently true for what we may call commercial purposes.

Mr. Wigham's big gas lights are now ablaze at the four corners of the refuge, north of Westminster Bridge. We confess to be not altogether satisfied with the result. The lanterns are muffed to a degree which must obstruct at least half the amount of light given off by the burners. When, as in the case of the electric light, the illumination proceeds from a mere point of intense luminosity, it is, of course, necessary to employ means to subdue and diffuse the light. This can hardly be necessary in the case of such burners as Mr. Wigham's, the flames of which, we take it, may be allowed to display their illuminating power without the interposition of muffed glass or opal shades. We cannot help thinking that a plain glass lantern would be better for the display of these magnificent lights, the cost of which is of some importance. We are informed that the consumption of gas for every 400-candle burner is about 60 feet per hour, or 240 feet per hour for the whole four. If, to simplify the calculation, we take 250 feet as the consumption, we arrive at the conclusion that the cost of the gas consumed in the four lamps is just 10½d. If, however, half of the light be cut off, the cost may be said to be doubled. In any case, the expense is trifling; but we fear it will prove too much for the Metropolitan Board of Works. As the lamps are to remain in competition with the electric light, we may hope Mr. Wigham will give them a better chance, by modifying, to some extent, the present condition of the lanterns.

The report of the Directors and the accounts of the Crystal Palace District Gas Company have been issued, in anticipation of their half-yearly meeting to be held on the 20th inst. The Company have, as usual, had a successful half year's working, and are able to pay maximum dividends on all classes of shares and stock, and to carry forward a balance of £1169. The steady progress which this Company make, under, it is true, favourable circumstances, is not a little due to the activity displayed by the energetic Secretary, Mr. M. Ohren, who pushes the use of gas in all directions, and whose industry, we are glad to see, is to be rewarded with an addition of £50 to his annual salary. Of the Bill which the Company are now promoting we shall have to say more when it comes before the Committee, and further reference will be made to the accounts when the half-yearly meeting has been held.

The Sheffield United Gaslight Company have issued their statement of accounts and the Directors report for the last half year, in anticipation of the meeting to be held on the 3rd proximo. Notwithstanding the reduction of price, and the great depression in trade, the result of the half year's working has been of a highly satisfactory character. After paying full dividends of ten per cent. on all classes of stock, the Company have a balance remaining of £2916, which, added to a balance from the previous half year, makes the total of unappropriated profits £17,733. The Company's reserve-fund now amounts to the large sum of £61,950. Under these circumstances, they can well afford to reduce the price one penny per thousand feet, as they intend to do, from the 1st of July next. The consumers of Sheffield must be thankful for small mercies. We are glad to see that, with the consent of the Corporation, the Company are about to make an exhibition of Mr. Sugg's new high-power burners in several prominent positions in the borough. The inhabitants of Sheffield have had a taste of the electric light; but we are certain, when they come to see the new gas lights, they will be satisfied with the superior illumination afforded by them.

The Harrow District Gas Company, we are glad to see, have had a good measure of success during the past half year. This well-managed Company have to struggle with some difficulties. They have to submit to high charges for the carriage of their coal, and much of their district is but sparsely populated. Nevertheless, we find the quality of the gas is extremely well maintained, and that no complaints are made by either Local Authorities or consumers. The profits of the past half year allow of the payment of a dividend of six per cent., free of income-tax, leaving a balance of £32 to be carried forward. Whether the Company have any reserve or not, the accounts do not inform us; but we may just point out the unthriftiness of paying away all current profits in dividends. "*Carpe diem*" is a joyous motto, but scarcely applicable when the affairs of a Gas Company are under consideration. Coals are expected to be cheaper; but they may be dearer, and the latter is the more probable.

The Bristol Gas Company, as usual, pay full dividends for the past half year. The state of the Company is eminently prosperous. The new works projected will soon be in progress, and the Contractors promise that they shall be in operation during the coming winter. Some additions will have to be made to capital. New shares, consequently, will soon be offered by auction, and the price these will fetch may be easily guessed.

The Hastings and St. Leonards Gas Company necessarily have had a good half year, and, we need hardly add, pay full dividends, carrying forward a balance of £499. The plant at the works has been considerably enlarged, but not too early, for Hastings and St. Leonards grow apace, and the Company are bound to supply the legitimate wants of all of the inhabitants. No lack of enterprise has ever been shown by the Hastings Gas Company, and we are perfectly certain that the Directors and Manager will leave nothing undone to fulfil every legal obligation of the Company.

The Gas Department of the Wigan Corporation have not done badly during the past twelve months, the labours of the Committee having, no doubt, been lightened by the use of a brougham, and thus it may have happened that the accounts show a net profit of £5300, the allocation of which has not been decided upon. The Gas Committee are about to enter upon the manufacture of sulphate of ammonia, from which they expect to, and we have no doubt they will derive a respectable profit. The Corporation are not happy in their relations with outside districts. They have been laying down mains in the district of the Standish Local Board, without the sanction of this important authority. A great fight was prepared for, but, inasmuch as the Corporation navvies retired before what we may call an overwhelming force brought by the Standish Local Board, the combat did not come off, and no breach of the peace was committed.

Water and Sanitary Notes.

The death-rate in the Metropolis rose the week before last to the almost unprecedented number (in the absence of cholera) of 29·2 per thousand. The Registrar-General candidly accounts for this large increase by recording the recent low temperature, and by pointing out that the greatest increase of mortality was caused by diseases of the respiratory organs. But, in the same report, we find Dr. Frankland's account of the results of his analyses of the Metropolitan waters in the month of February. Let us understand what the statement of the condition of the waters during the *month* of February means. Unless we are mistaken, the waters subjected to analysis are taken on a particular day. We are told upon what day, and thus the analysis simply represents the chemical, microscopical, and physical condition of the water on *one day*, and by no means for the whole month. The same must be said of Dr. Tidy's reports. But the water which was turbid, and had an excess of organic matter, on, say, the 1st of the month, may have been bright and comparatively free on the 6th. Filtration, which may have been inefficient for a few days, might be perfect after a short interval of time, and if Dr. Frankland had taken his waters at another date, he might have found their condition very different. What we have to protest against here is, taking a sample of water drawn on a certain day to represent the quality supplied all through a month. It is a gross absurdity, and such examinations as these must be brought to an end. If we are to have examinations of the Metropolitan waters, worthy of record, we must have them made day by day. We do not suppose such a thing was contemplated when Lieut.-Col. Bolton's appointment was made, but it must be clear to every one that, if we are ever to obtain a satisfactory knowledge of the state of the water supplied to this Metropolis, it can only be acquired by a day-by-day examination.

A town's meeting, under the Borough Funds Act, 1872, was recently held at Colchester, with a view to obtain sanction to the opposition to the Water Company's Bill. It is notorious that the Town Council are very anxious to obtain possession of the water undertaking, regarding its acquisition by the Corporation as "essential to the health of the borough and the "welfare of the inhabitants." It is curious to see that the Town Council are speculating on the possibility of making money out of the water undertaking, in aid of rates. This prospect, we dare say, is very captivating to the ratepayer, and a Colchester man would, no doubt, be vastly smitten with the idea, and readily consent to the payment of any sum for water, if it promised to relieve him of a halfpenny rate. The ratepayers have consented to have money spent on a wild goose scheme in opposing the Company's Bill, which is a very reasonable one, asking for no powers which are not now usually granted to Water Companies. The opposition will, of course, proceed, but we take it that long faces will be drawn in Colchester when the decision of the Parliamentary Committee is made known. Colchester ratepayers look very closely after the expenditure of public funds, and we think they may have to regret this wanton opposition to a measure calculated rather to benefit than to injure them. There is, after all, in these days, little difference between assessed value and rack-rent; and as for rates for extra closets and baths, where is the tradesman in Colchester who would not make similar charges?

The water from the wells in the neighbourhood of Liverpool does not satisfy the fastidious members of the Water Committee. The wells are situated in unsewered districts, where cesspools abound, and when the wells are pumped during rainy weather, it is quite natural that organic pollution should reach the water. The porosity of the new red sandstone is very well known, but the Committee do not seem to realize the possibility of fissures existing, which allow of a free access of sewage matter to the wells. The moral, as everybody but Alderman Bennett can see, is, Get rid of the well supply as soon as possible, and find better water from a purer source. To this "complexion" it must come at last, and the Corporation of Liverpool may as well acknowledge the fact.

The Metropolitan Board of Works have agreed to pay the Engineers and Geologists whom they employed over their abortive water schemes of last year the sum of £6721. An appeal *ad misericordiam*, made by the Board, induced the professional gentlemen to reduce their charges to this amount. It is somewhat of a novelty to find a body like the Metropolitan Board of Works asking for reductions of this kind, but we all know how very careful they are of the ratepayers money. Then comes the awkward question, Who after all are to pay these reduced charges? For the moment, this part of the subject remains in abeyance, but more will certainly be heard of it.

One of those quaint gatherings which sometimes take place under the name of ratepayers meetings was recently held at Ely, to urge the Local Board to adopt Mr. Tomlison's scheme for the introduction of a new supply of water from the chalk. The important business which had to be transacted brought an attendance of 150 individuals, but when a resolution was put to memorialize the Local Board to take up the plan, only twenty-five voted—eleven for and fourteen against. This result did not satisfy the mover, so another show of hands was called for, and again a majority of three was found to vote against the resolution. Thus, in all probability, Ely will continue to depend upon a supply of water from the River Ouse, and only careful filtration is necessary to make the supply of excellent quality.

We understand that the Lower Thames Valley Main Sewerage Bill will be re-introduced next session, and, it is hoped by the promoters, with a prospect of success which the prompt defeat of the recent measure could hardly promise. The opposition against the Bill just now rejected was led by the Water Companies, who certainly had some grounds for objecting to the measure; but these might easily have been removed, if it had gone before a Select Committee. The rest of the opponents, powerful as they may have been, call for but little notice in our columns. Colonel Williams and other proprietors, lessees, or whatever they may be, of the Sandown Park Racecourse, have, no doubt, much parliamentary influence; but we fail to see in what way the scheme, if carried out, would have affected their interests. We put last week the case of the proprietors of land adjacent to the proposed sewage farm, and have nothing more to say on the matter. We may again express a regret that the Bill was so summarily dismissed from consideration. The interests of the Water Companies might, we think, have been easily protected, if their objections to the measure had been heard by a Select Committee. It would not have been difficult to strike out the section which referred to them in the Bill, and to this, no doubt, the promoters of the scheme would have readily assented. As the matter stands, however, another year must elapse before a commencement can be made of works which would be calculated to improve to no inconsiderable extent the state of the River Thames. Frankly speaking, we do not like earwigging; we prefer to see a case decided on its merits. We notice the opponents of Colonel Haywood's scheme —or, rather, the scheme of the Lower Thames Valley Main Sewerage Board—have asked the West Kent Main Sewerage Board whether their sewers are of adequate capacity to carry away the sewage of an additional population of 110,000. This latter body have replied in the affirmative; so next year Colonel Haywood and Sir J. Bazalgette may find themselves in opposition. The matter in dispute is one we cannot meddle with, and must leave the big Engineers and the Authorities to fight out the vexed question among themselves.

The Corporation of Glasgow and the neighbouring Authorities, whose drainage affairs are mixed up together, cannot agree as to the plans they shall adopt to get rid of their sewage. They have had some systems proposed, notably two alternative schemes devised by Mr. Bateman, C.E.; but the expense of executing either of these alarms the Authorities, who are still hopeful that a cheaper mode of disposing of their sewage will presently be found. The Corporation plead for a delay of twelve months, to give opportunity for the appearance of a *Deus ex machinâ*, who will get them out of their difficulty at little cost. In the course of a year, they appear to think some scheme is sure to turn up, and then they can fairly enter upon the work of effectually sewering Glasgow and its neighbourhood. The Home Secretary appears to have pressed the Corporation to do something shortly, and an inquiry has recently been held, in the course of which the legal agent for the Corporation of Glasgow promised that within twelve months a scheme should be decided upon. As it will take many years to carry it into execution, it does not very much matter whether the plans be settled this or the following year.

The Thames River (Prevention of Floods) Bill has been relegated to the consideration of a hybrid Committee, and the only objection made in the House of Commons had reference to the constitution of the Committee. Several members strenuously opposed the nomination of Sir J. M. Hogg as a member; but, in the event, the name of the Chairman of the Metropolitan Board was retained. We do not think it at all matters, for the worthy baronet is not the man to exercise much influence, undue or other. One thing we hope, and that is, that whatever the Committee decide upon, the Metropolitan Board shall be bound to carry out.

Gas in Paris.—The revenue of the Paris Gas Company steadily grows. The amount collected last January was £263,429, as compared with £245,557 in January, 1878, showing an increase of £17,872, or 7·28 per cent.

THE COST OF THE ELECTRIC LIGHT.

The Report made to the Streets Committee of the City Commissioners of Sewers by Colonel Haywood, the Engineer to the Commission, on the experiment in electric lighting on the Holborn Viaduct, states at its close: "The broad results of the "experiment appear to be that the electric light on the Viaduct "is about seven-and-a-half times the cost of gas, and that, sub-"ject to conditions under which it is given off, the illuminating "power of the electric light is about seven times that of gas." This would make it appear that, light for light, gas is very slightly cheaper than the Jablochkoff "candle." If the balance in favour of gas were no more than this, we might apprehend that a little further improvement in the economic value of the electric light would give the latter the advantage, so far as the lighting of large spaces is concerned. But, as Colonel Haywood signifies, the statement is made "broadly." He himself says, in reference to the Viaduct experiment, "It must, however, be held "in mind, that the electric light is given off with great intensity "from sixteen points only, whilst the gas is given off at "eighty-six points. Thus, the feebler light is more uni-"formly diffused than the stronger," and we are properly told that, "for street purposes, the indivisibility of the electric "light, and the diffusibility or quality of the light, are points "to be thought of when comparing the value of these two "modes of street illumination." But, even apart from this consideration, we should not expect to find gas so nearly on a level with the electric light, in respect to the cost of a given amount of illuminating power. The City Engineer, we would observe, is not only giving "broad results," but is dealing with imperfect and illusory data. Colonel Haywood is not to blame for this. He takes certain data, and works out appropriate results; but he leaves others to judge whether the data can be relied upon. That part of the report to which we now refer is, in fact, seriously vitiated by the absence of those "photometrical "experiments" which were originally contemplated, in order to determine the relative values of the light from gas and electricity. These experiments have not been made, and are now definitively abandoned. Hence the "relative values" are not discoverable, except in a very "broad" way, and the Engineer is like a draper or a grocer, who tries to take stock without either weights or scales.

As most of our readers are very directly interested in this question, they would doubtless like to know at once how Colonel Haywood gets his results, "broad" as they may be. The clue to the error is not hard to find. In the absence of independent observations, Colonel Haywood takes the estimate of the parties who supply the electric light—namely, the Société Générale d'Electricité. Thus we read, "Each electric lamp is said by "the Société to be equal to one hundred gas-burners, such as "are used in the streets of Paris." Colonel Haywood has then to estimate the lighting power of the Paris gas-lamps, and he puts them down at twelve candles each. A City gas-lamp is reckoned as giving the light of sixteen candles. Accordingly, it will be seen that Colonel Haywood calculates on a lighting power of twelve hundred standard candles for each of the Jablochkoff lights when uncovered. The proportion of light cut off by the opalescent globes he estimates at fifty per cent., not because he thinks that to be the correct ratio, but because he adopted that percentage in his previous report. He observes that the loss of light is now stated to be sixty per cent. Thus we see that in every way the power of the electric light is exalted—that is to say, exaggerated. The naked light is not equal to twelve hundred candles. As we stated last week, the true estimate approaches something like five hundred candles, reduced by the opalescent globe to about two hundred candles. If we reckon the practical amount of light at two hundred and fifty candles, and estimate this as being forty per cent. of the uncovered light, we find the latter to be equal to six hundred and twenty-five candles. As a matter of fact, Colonel Haywood has just about doubled the lighting power of the Jablochkoff lamp, so that, instead of the electric light on the Viaduct being "about seven times" the strength of the gas, it only excels to the extent of three-and-a-half times. Light from electricity, therefore, as exemplified by the Jablochkoff lamp, is fully twice as dear as light obtained from gas. In other words, by adopting electricity instead of gas, we pay seven-and-a-half times as much as before, and get only three-and-a-half times the former amount of light. But even this is giving to the electric light credit for more than properly belongs to it.

Having accepted an extravagant estimate as to the lighting power of the Jablochkoff candle, Colonel Haywood says: "If "these assumptions be correct, sixteen electric lamps should "give light equal to that of twelve hundred of the City gas-"lamps on the Viaduct, and, as there are eighty-six gas-lamps "on the Viaduct, there should be, with uncovered lights, about "fourteen times more light given by electricity than by gas." So also, on the theory that only fifty per cent. is intercepted, there ought to be seven times the light that gas afforded. Those persons who have personally compared the two modes of illumination on the Viaduct, will assuredly dispute the conclusion that the Jablochkoff lamps increased the illumination sevenfold. Our estimate would make it less than threefold, and this, we think, agrees pretty well with common observation. Succinctly stated, the difference between our reckoning and that of the report is as follows:—Colonel Haywood assumes the uncovered Jablochkoff light to have an illuminating power equal to twelve hundred candles, reduced to six hundred by the opalescent globe. We reckon the reduction to be sixty per cent. instead of fifty, which would bring down the light to four hundred and eighty candles. But we further reckon that the actual illuminating power of the uncovered Jablochkoff light is not more than six hundred and twenty-five candles, and is probably as low as five hundred. With sixty per cent. of the light intercepted, the power is thus reduced, in the first place, to two hundred and fifty candles; and, in the second instance, it comes down to as low as two hundred candles. If we apply this last calculation as a correction to Colonel Haywood's report, we get only one-third the practical lighting power which has been reckoned upon, and the illuminating power of the electric light, instead of being about seven times that of the gas, is not even three times, being, in fact, little more than twice. Hence it is possible for the electric light, if strictly judged by the Viaduct experiment, to come out as being quite three times as costly as gas, reckoning on the basis of equal quantities of light. These calculations, it is also to be noticed, are independent of the fact that the "feebler light "is more uniformly diffused than the stronger."

The sixteen electric lamps on the Viaduct were lighted from sunset to midnight, at a charge of £5 per night. The average number of hours each night was seven, and the cost per lamp was therefore 10·7d. per hour. A gas-lamp upon the Viaduct, including lighting, extinguishing, and cleaning, costs £4 17s. 6d. per annum, and the rate per hour is 0·27d., or a little more than a farthing. As Colonel Haywood reckons the power of the covered Jablochkoff light at six hundred candles, and that of the gas-lamp at sixteen, it would require rather more than thirty-seven gas-lamps to emit, in the aggregate, as much light as one Jablochkoff lamp. The cost of the gas would thus be about 10d.—approximating very nearly to that of the electric light. But we have seen reason to adopt a lower estimate of power for the latter. If we take the basis of two hundred candles, it will only require between twelve and thirteen gas-lamps to equal one of the Jablochkoff lamps, and the hourly expense of the former will be only a little more than 3d.; thus again showing gas to be three times as cheap as the Jablochkoff light.

It may be proper that we should now imitate Colonel Haywood's example, and betake ourselves to "broad results." In so doing, we shall still try to be correct. Thus the lighting of the Viaduct by electricity for sixty-four nights, at £5 per night, amounted to £320. The cost of the gas that was saved by the introduction of the electric light was only £50 10s. 10d. But this reckoning as to the gas is an exaggeration. It "represents "the value of the gas that would have been consumed in sixty-"one lamps from sunset to midnight, and twenty-five lamps "from sunset to sunrise." The gas that would have been burned from midnight to sunrise, we submit, forms no part of the experiment. The case is thus stated in another part of the report:—"The number of public gas-lamps not lighted when "the electric lamps are burning is eighty-six. At midnight, "sixty-one gas-lamps are lighted, twenty-five gas-lamps remaining "unlighted, owing to the electrical apparatus preventing this "being done." Nevertheless, all the gas only comes to £50 10s. 10d., whereas the electric light cost £320. Consequently, the Viaduct ought to have had more than a sixfold illumination, which it certainly did not have. We would suggest that the Commissioners of Sewers should see what Mr. Sugg, in connection with the Chartered Company, could do for the Holborn Viaduct, if allowed £5 per night, the said "night" averaging seven hours! A mere multiplication of the ordinary gas-lamps will indicate what might be done. That is to say, instead of eighty-six gas-lamps, hitherto found sufficient, there might be six hundred and thirty-five, giving the light of more than ten thousand candles, to compare with sixteen electric lamps, giving the light of between three and four thousand candles. Even now we have not reckoned all the outlay on the electric light, but we need go no farther. Colonel Haywood himself, after calculating the actual expense, says: "Applying these rates to a whole year, electric "lighting would cost about £3072, and gas lighting £419." He

then observes: "Electric lighting, at present charges, is, there-"fore, about seven-and-a-half times as dear as gas lighting." Nevertheless, the calculation follows which makes it appear that, light for light, the two cost very much the same. If it were so, we feel assured that the extravagant rates just quoted would be considerably reduced. It is just because the real lighting power of the Jablochkoff system falls so far below what has been commonly supposed, that we find the actual experience on the Viaduct to be what it is. The French Company are now offering reduced terms, but the reduction must be very large if it is to turn the balance in favour of the new light.

With so marked a result in the case of the City experiment, it may be asked—Why should the Metropolitan Board go to the expense of prolonging their trial of the same system on the Victoria Embankment? The Board have just agreed to continue the trial of the Jablochkoff light on the Embankment for three months longer. For our own part, we are glad to see the electric light experimented on to the uttermost. The Jablochkoff system is being tested on the Embankment in a manner essentially different from that pursued on the Viaduct. In the latter instance, the test was altogether of a "broad," practical nature. Colonel Haywood has drawn up a very plain and honest report, leaving every one to form his own conclusions upon it. But Mr. Keates has a much more onerous task before him, and it is desirable that he should be enabled to complete it. His report, when it appears, will derive its importance from the care and completeness by which it will be characterized, and it would be a matter for much regret if he were prevented from pursuing his investigations to their proper termination.

One word remains to be said with regard to the light which is some day to stream forth upon mankind from Menlo Park. The latest news concerning Mr. Edison, as given by the *New York Herald*, runs thus:—"Regarding the electric light, Pro-"fessor Edison is slowly but surely reaching the perfection he "aims at. He is now completing the mechanism of his lamp, "with a view to its adaptation to public and private lighting by "electricity." "Slow and sure" is a good motto, though we hardly thought it was characteristic of Professor Edison.

South-West of England District Association of Gas Managers.—The half-yearly meeting of this Association was held at Weymouth, in the Gas Company's Board-Room, on Tuesday, the 11th inst., under the presidency of Mr. Thomas Hardick, of Salisbury, whose address will be published in next Journal. Papers were afterwards read by Mr. Thomas Anderson, of Bath, on "Effective Scrubbing and Washing of Gas;" and by Mr. Edward Howell, of Yeovil, on "Notes on the Purification of Gas." Interesting and exhaustive discussions followed each paper. The members afterwards dined at the Cutter Hotel, and all admitted having thoroughly enjoyed the day's proceedings.

New Companies Registered.—The Havant Gas Company, Limited, was incorporated on the 26th ult., with a capital of £3000, in £5 shares The Company was originally registered by deed of settlement, on Dec. 8, 1852, having been formed for the purpose of supplying Havant and the neighbourhood with gas.—On the 28th ult. the Alexandria Water Company, Limited, was registered with a capital of £350,000, in £20 shares. The Company is formed for the purpose of taking over the water-works which are at present in existence for supplying the City of Alexandria, in Egypt.

Improved Public Lighting.—The Croydon Gas Company are about to erect experimentally a patent shadowless lamp at the junction of High Street and North End, Croydon. The new lamp is intended to replace three of the ordinary lamps, and will furnish a light equal to about 200 candles.—The Lighting Sub-Committee of the Sheffield Town Council have recommended that permission be given to the Gas Company to light the Market Place, Fruit Market, Hay Market, &c., with Sugg's improved burners, and that they be allowed to use or alter such of the lamps now erected, and to erect such other lamps as may be necessary, the entire cost to be borne by the Company.

The Opposition to the South Shields Gas Company's Bill.—At the meeting of the Jarrow Town Council on Wednesday last—the Mayor (Alderman Huntley) presiding—Alderman Nixon, as Chairman of the Parliamentary Committee, stated that they had that day met the Directors of the Gas Company at South Shields and, as a whole, the meeting had been very satisfactory. They had succeeded in obtaining a reduction of something like 4d. per 1000 cubic feet in the price of gas, for in the new Bill the price was 3s. 6d., and they had arranged that it should be 3s. 3d., with 7½ per cent. discount. The Town Clerk said that the South Shields Gas Company had agreed to strike out of their Bill the proposed purchase of the Whitburn Gas Company's works, all that they wanted being power to supply gas in that district. Regarding the increase of capital, the Committee agreed that it should stand as in the Bill. With reference to the price to be charged for the public lamps, the Company refused to give way, and the Committee agreed to accept their price. The Gas Company agreed to strike out the insurance clause, but would, of course, maintain their ordinary reserve-fund. On the question of illuminating power, the Gas Company agreed to the terms suggested by the Corporation analyst (Mr. Pattinson). The Company would not agree to give up the clause as to the electric light, and, after full discussion, the Committee agreed to let it stand. As to gas-stoves, the Gas Company agreed to strike out the word "manufacture," and to that also the Committee assented. After some remarks by Alderman Berkley, it was resolved—"That the terms of agreement between the Committee and the Gas Company, as reported, be acceded to, and the Council appoint Alderman Nixon and Alderman Berkley to watch the further progress of the Bill, and these gentlemen and the Town Clerk be authorized to withdraw the petition of the Corporation against, upon being satisfied that the Bill is in accordance with the terms agreed upon."—We understand that the South Shields Corporation have also withdrawn their opposition to the Bill on substantially the same terms as the Jarrow Corporation.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CLXXII.

THE TREATMENT OF RESIDUAL PRODUCTS.

The French System of Distilling Tar (*continued*).

To return to the oils obtained from coal tar. They may, roughly, be divided into three categories. The first includes the oils distilling between 30° and 140° C. = 86° to 284° F., and having a specific gravity of 0·780 to 0·850. These are called light oils; they nevertheless retain some naphthalene and carbolic acid. The second part contains the products distilling between 150° and 210° C. = 302° to 410° F. They are termed by the French distillers, medium oils (*huiles moyennes*); their densities lie between 0·830 and 0·890. The third part of the distillate contains the heavy oils, distilling between 220° to 350° C. = 428° to 662° F., and upwards, and having a mean specific gravity of 0·920 to 0·930. The last values are taken from the work of MM. Girard and De Laire; but there must be some error in them, as these oils evidently correspond to those obtained by the English and Scotch systems, which *sink in water*, and which we have hitherto described as pitch or creosote oils.

When the tar is poor in the lighter oils, it is better to fractionate them into two parts, instead of three; that is to say, those which distil under 200° C. = 392° F., and those over 200°. Each of these is to be condensed in a separate cooler. When the thermometer indicates 200° C. = 392° F., the still-man directs the vapours into the second cooler; and when it is desired to separate into three fractions, into a third. These condensers are cooled differently, and their pipes are not of the same diameter. The condenser for light oils is cooled with cold water, which runs in the opposite direction to the vapour.

The worm tub for the medium oils is heated to 30° or 40° C. = 86° to 104° F. That for the heavy oils is heated to 60° or 70° C. = 140° to 158° F., and the pipe must be wider, to prevent its being choked up by naphthalene and anthracene.

Before purifying the oils which we have described, they must be rectified in stills heated by steam at high pressure, either with jacketed stills, or with a worm.

Let us recapitulate the boiling points of the light, heavy, and medium oils:—

Light oils, distilling below	.	140° C. = 284° F.
Medium oils, " "	.	210° C. = 410° F.
Heavy oils, " "	.	350° C. = 662° F.

We commence with the medium oils. They are fractionated into three parts—below 140° C. = 284° F.; from that point to 210° C. = 410° F.; and above 210° C. The first is added to the light oils, the third to the heavy oils. The light oils are then distilled into two fractions—below 140° C., and above. The latter is added to the medium oils. The distillation is conducted steadily, to avoid bumping, or sudden rushes of vapour. After this rectification, the light oils are almost free from the heavy ones and solid substances. The medium oils contain very little light or heavy oils.

It is now necessary to purify them separately.

Purification of Light Oils, or Naphtha.

The following table of the constituents of light oils has been considerably modified from that given by MM. Girard and De Laire. That given by them includes some substances which the progress of science has shown not to exist, and others which have not been found in the tar from ordinary gas coal. The boiling points given by them also required revision.

Table of Substances Contained in Light Oils.

Name.	Formula.	Boiling Point. Deg. Cent.	Boiling Point. Deg. Fahr.
Ammonia	NH^3	—33	—27
Aniline	C_6H_7N	182	360
Pyridine	C_5H_5N	117	243
Picoline	C_6H_7N	134	273
Lutidine	C_7H_9N	154	309
Collidine	$C_8H_{11}N$	179	354
Parvoline	$C_9H_{13}N$	188	370
Pyrrol	C_4H_5N	133	271
Hydric sulphide	H_2S	—	—
Hydric sulphocyanide	HCNS	—	—
Carbolic acid	C_6H_6O	188	370
Hexylic hydride	C_6H_{14}	68	154
Octylic "	C_8H_{18}	119	246
Decylic "	$C_{10}H_{22}$	159	318
Pentylene	C_5H_{10}	31	88
Hexylene	C_6H_{12}	71	160
Heptylene	C_7H_{14}	99	210
Benzene	C_6H_6	80	176
Toluene	C_7H_8	111	232
Xylene	C_8H_{10}	139	282
Cumene	C_9H_{12}	166(?)	331
Cymene	$C_{10}H_{14}$	176	349
Mesitylene	C_9H_{12}	163	325

The boiling points of hexylic, octylic, and decylic hydrides, as given in the above table, were determined by the writer* by a new method. The substances, after a laborious fractionation, involving 1000 distillations, had their vapour densities determined with great care; and the fraction, the vapour density of which gave the nearest number to the truth, was considered pure, and its boiling point was assumed to be the true one for the substance.

The method of purification adopted by the French distillers is, in principle, the same as that which we have described under the heading of the "Scotch System." They use for the purpose, water, acid, and alkali. They place three agitators one above the other. These

* "Philosophical Transactions." January, 1857.

and the stirrers are lined with lead, in the same manner that we have before described. The last agitator is placed over the still. This plan has decided advantages, as it allows the oils to be run from one into the other, and, finally, into the still, without the necessity for pumping.

The first treatment is with water in the agitator which stands highest in the series. The water having been removed, the oil is run into the next agitator, and treated with 5 per cent. of sulphuric acid, and stirred for several hours. The mixture is settled for twelve hours; the sludge is then run out, and, if necessary, the acid treatment is repeated. When the oils have been sufficiently treated with acid, they are washed two or three times with water, which is removed in the usual way. The oil is then run into the third agitator, and treated with 2 or 3 per cent of a solution of caustic soda, of the same strength as was recommended in the Scotch system—that is, the solution should contain about 20 per cent. of caustic soda. The naphtha is then washed twice with water, and allowed to remain six hours before being decanted. The purified oils are then distilled with high-pressure steam, in an apparatus provided with a thermometer, if accurate boiling points be required.

The naphtha which passes between 80° and 115° C. = 176° to 239° F., is almost entirely composed of benzene and toluene, and forms the benzole of commerce. It is principally used by the manufacturers of aniline, who rectify it again before use, to remove impurities. In this state it is used in the manufacture of oil of mirbane, which is used to give the smell of bitter almonds to soap. The perfume is, however, inferior to the true essential oil of bitter almonds.

The oils which distil between 115° and 150° C. = 239° to 302° F., may be mixed with the lightest products, distilling below 80° C. = 176° F., and then, without any further rectification, can be used as burning oils and for removing grease.

Purification of the Medium Oils.

These oils, after the first rectification, and having had added to them the higher products from the light oils obtained in the first distillation, and also the residue left in the still after the second distillation, contain the same substances as the lighter oils, and the same impurities with some others of higher boiling points. This arises from the fact that, in distilling mixtures, the lighter or more volatile substances carry over substances of much higher boiling points.

It is found in practice that the medium oils distilling below 210° C. = 410° F. contain coridine, which boils at 211° C. = 412° F., and naphthalene, which boils at 218° C. = 424° F. According to the writer's experience, the oils boiling at 210° C. contain substances having a much higher boiling point than coridine or naphthalene.

The medium oils are purified in exactly the same manner as the lighter ones, except that more sulphuric acid and caustic soda are used. According to MM. Girard and De Laire, two treatments with 5 per cent. of sulphuric acid are sufficient; but they admit that it is impossible to tell how much caustic soda will be required except by experiment. They therefore recommend a preliminary trial on the small scale.

The writer, many years ago, occupied himself for a long time with this question; but he found that even with the tar from the same gas-works, such different quantities of carbolic and cresylic acids were found in the medium and higher oils, that the amount of soda to be used had to be determined before each treatment. The differences were so great as to induce a suspicion that the gas company were using mixtures of coal; and this impression was confirmed by his finding very variable quantities of non-nitrifiable oils in the lighter products. On instituting inquiries, he found that such was the case. When using a coal which gave a low candle gas, they used a greater quantity of cannel and Boghead coal, and this fully accounted for the variations in the laboratory experiments.

After treatment of the medium oils with caustic soda, the alkaline solutions are preserved for the preparation of carbolic acid. This question will not, however, be entered upon here.

The purified medium oils, after treatment with acids and alkalies, are to be rectified in a still heated with palm or paraffin oil. Superheated steam may also be employed, but its use is not so economical as the others.

These medium oils are used for lighting purposes, and also for dissolving india-rubber. If it be desired that all offensive smell be removed, that end can be accomplished by using nitric acid with the sulphuric acid, as previously described under the heading of the "Scotch System."

Purification of the Heavy Oils.

The heavy oils, like the lighter ones, contain the higher bases of the pyridine series from parvoline, first discovered by the writer in the tar from the Dorsetshire shale, to viridine, which is the last member of the series yet known. The writer has shown that the leucoline and chinoline series are isomeric, and not identical; but Ballo, Dewar, and others have recently discovered that the chinoline series do really sometimes exist in some tars.

The writer, in examining the chinoline series, in addition to the chinoline of Gerhardt, discovered the following bases:—

Lepidine	$C_{10}H_9N$.
Dispoline	$C_{11}H_{11}N$.
Tetrahiroline	$C_{12}H_{13}N$.
Pentahiroline	$C_{13}H_{15}N$.
Isoline	$C_{14}H_{17}N$.
Ettidine	$C_{15}H_{19}N$.
Validine	$C_{16}H_{21}N$.

If, therefore, the researches we have alluded to are confirmed, the bases of the heavy oils are sure, one day, to be of value to the tar distiller, as they yield, on proper treatment, brilliant and beautiful colours.

In addition to the leucoline of Runge, the writer has found in the heavy or pitch oils two more bases—iridoline $C_{10}H_9N$, isomeric with lepidine, and cryptidine isomeric with dispoline.

In spite of the fact that the crude, heavy oils accumulate to an inconvenient extent in tar distilleries, there is no doubt that they will eventually have important applications.

The heavy oils also contain naphthalene and anthracene. The former, so long valueless, is now being energetically investigated with a view to its practical application. Already results of importance have been obtained; and naphthalene will one day add in an important manner to the tar distiller's revenue.

Anthracene is of great value as being the raw material for the comparatively new artificial alizarine. It is contained in the last runnings of the heavy oils, which solidify on a glass plate, as mentioned in describing the English system.

The heavy oils are treated in pretty much the same manner as the medium oils when it is intended to purify them. The first operation is to agitate them with sulphuric acid. MM. Girard and De Laire, however, prefer hydrochloric acid for this purpose. They are then treated with soda solution of 6 per cent. strength. The alkaline solution is to be kept for the preparation of carbolic and cresylic acids.

The product is to be distilled with the naked fire. The portions coming over between 215° and 230° C. = 419° to 446° F. yield chiefly naphthalene, those between 290° and 320° C. = 554° and 608° F. contain anthracene, and are to be kept apart to allow of its extraction.

Communicated Article.

GAS AS FUEL.

II.

By "Isca."

It must be remembered that a given weight of any fuel will always yield the same amount of heat, so that the heat developed, say, from coal, in a common grate, is equal to that which would be given by the same quantity of coal in the largest blast furnace. Similarly, the heat of an ordinary lucifer match, or the flame of a tallow candle, is not one whit less than that yielded by an equal weight of wood or tallow burning in the heart of a great conflagration.

No kind of furnace or arrangement of draught can increase the value of any sort of fuel. The only duty of artificial appliances of that nature is to provide for the admission of the necessary amount of air to effect the oxidation of so much carbon or hydrogen, or both, as may be required *within a certain period of time*. The more carbon a combustible contains, the less ready is it to combine with oxygen, and therefore it is found that with almost pure carbon in bulk—as hard coke for locomotives, &c.—the strongest blast is necessary to cause its complete conversion to carbonic acid.

There are only two means by which the quick and complete combustion of fuel may be effected. The first and most usual is to urge a large quantity of air over and through the great masses of incandescent material; and the other method is that of reducing the fuel itself to a state of fine division, whereby its active surface is so much increased, that, when intimately mixed with the proper quantity of air, and brought under suitable conditions, the process of oxidation of each particle is effected *per saltum*.

The theoretical reasons for the latter mode of treatment are perfectly sound, but the efficacy and handiness of the apparatus which has been employed to carry them out has left much to be desired; and the practical advantages which have been actually realized are not such as to cause the general adoption of any of the methods which have been introduced for this purpose. It is, however, on record that powdered coal has been perfectly consumed by the admixture with it, in the furnace, of the exact weight of air theoretically necessary; so that it is evident that this desirable object can be attained in the use of fuel in a more suitable form than in solid lumps borne on fire-bars in the usual way. Of course, fuel in this shape can only be used for steam-boilers, iron furnaces, and similar trade purposes.

The step from fuel in powder to fuel in liquid form is not difficult. If we agree with the arguments in favour of the former, it must be admitted that they apply with great force to the latter. If continuous firing is of any value—and no one would deny that it is so—a fluid can be caused to flow to any desired point with the greatest regularity, and can also be made to take any desired quantity of air with it. An oil is always ready for lighting, and, from the time when it is first set on fire to the last drop, it can be consumed to its fullest power, and without residue of cumbersome and useless matter. As a source of heat under perfect control, and capable of being used in small quantities and without a furnace, oil has only one rival—in gas; and, in point of portability, it is undoubtedly superior to any other combustible. As long as the oils in common use for illuminating purposes were derived from animal or vegetable sources, their cost was such as to preclude their general use as fuel, for which, indeed, they were not eminently qualified; but the cheapness of mineral oils, not less than their calorific power, has led to their common employment as fuel for certain purposes.

Alcohol has always been in demand as a handy source of heat for small requirements, for which its highly inflammable nature—consuming without depositing soot—renders it very convenient; and although its real heating power is not large, it is readily available.

Its costliness, however, even in the form of methylated spirit, is its great drawback.

Bearing these preliminary observations in mind, together with other considerations respecting the comparative suitability of different fuels for ordinary purposes which must occur to every one, the following tabular statement, compiled from various authorities, of the composition and value of various combustibles in common use, will be found useful:—

TABLE *of the Average Composition of Fuels.*

Fuel.	Components per Cent. by Weight.							Estimated Value in Units per Pound.
	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Sulphur.	Ash.	Water.	
Hydrogen	—	100	—	—	—	—	—	62,500
Carbon	100	—	—	—	—	—	—	14,500
Coal—								
Welsh	83·78	4·79	4·15	0·98	1·43	4·91	—	14,817
Newcastle	82·12	5·31	5·69	1·35	1·24	3·77	—	14,776
Lancashire	77·90	5·32	9·53	1·30	1·44	4·88	—	13,776
Derbyshire	79·68	4·94	10·28	1·41	1·01	2·65	—	13,841
Scotch	78·53	5·61	9·69	1·00	1·11	4·03	—	14,136
Averages	80·40	5·19	7·87	1·21	1·25	4·05	—	14,289
Coke—								
Dry and fresh	92·00	—	—	—	0·50	7·50	—	13,340
Average state	84·75	—	—	—	0·75	7·50	7·00	12,288
Wood—								
Perfectly dry	50·00	5·30	41·70	1·00	—	2·00	—	7,312
Ordinary state	40·05	4·20	33·40	·75	—	1·60	20·00	5,826
Lignite, dry	69·00	5·00	18·80	1·20	—	6·00	—	10,661
Peat	45·30	4·60	23·00	1·00	—	1·80	24·20	7,649
Wood charcoal	92·00	—	—	—	—	8·00	—	13,340
Petroleum	85·00	13·00	2·00	—	—	—	—	20,293
Petroleum oils	72·60	27·40	—	—	—	—	—	27,652
Olive oil	77·21	13·36	9·43	—	—	—	—	18,808
Alcohol	51·98	13·70	34·32	—	—	—	—	13,402
Tallow	79·00	11·70	9·30	—	—	—	—	18,042
Beeswax	81·60	13·90	4·50	—	—	—	—	21,169

Some kinds of fuel, but more particularly the solid forms, are commonly found saturated with water, which depreciates their value in two ways—first, by the actual loss of material due to the weight of water present, and bought, it may be, at the price of the dry combustible; secondly, by the amount of heat which that water abstracts from the fuel in being raised to the temperature at which its vapour leaves the furnace with the other products of combustion, and which amount is, of course, diverted from its proper object, and therefore lost. And when a combustible contains oxygen and hydrogen among its constituents, they are considered as being already in the form of water, and therefore it is only the excess of hydrogen, over the equivalent weight which will unite with the whole of the oxygen present to form aqueous vapour, which can be estimated to give any useful effect.

The composition of coal gas is so varying with different samples, that it is difficult to assign a particular value to it, as may be done in the case of most other combustibles. The following analysis of gas, which is deduced from an example given in the *Journal of the Franklin Institute* of America, for February, 1879, may, however, be taken as a sample of gas as supplied throughout the country; and, not being of very high quality, the total of its heating power will not be open to question as being a too favourable result:—

TABLE *of the Proportion by Weight of the Constituents of One Pound of Coal Gas.*

Symbol.	Component.	—	Hydrogen.	Carbon.	Oxygen.	Nitrogen.	Heating Power in Units.
H	Hydrogen	·0731	·0731	—	—	—	4,573·4
CH_4	Marsh gas	·4728	·1182	·3546	—	—	12,530·8
C_2H_4	Olefiant gas	·1844	·0307	·1536	—	—	4,149·1
CO	Carbonic oxide	·1363	—	·0584	·0779	—	598·0
CO_2	Carbonic acid	·0716	—	·0195	·0520	—	—
4N+O	Air	·0469	—	—	·0104	·0365	—
H_2O	Vapour of water	·0146	—	—	·0129	—	—
—	Coal gas	1·0000	·2237	·5862	·1534	·0365	21,851·3

This result closely approximates to the value assigned by Dr. Letheby, which is 21,060 units per pound; the difference, slight as it is, being susceptible of reduction when the lower value assigned by him for hydrogen is taken into account.

It will now be necessary to state the calorific power of coal gas in respect to its *bulk*, that being the basis of its usual conditions of sale and consumption.

TABLE *by Weight of the Constituents of* 100 *Cubic Feet of Coal Gas in Pounds and Decimals.*

Symbol.	Component.	—	Hydrogen.	Carbon.	Oxygen.	Nitrogen.	Heating Power in Units.
H	Hydrogen	·23340	·23340	—	—	—	14589·146
CH_4	Marsh gas	1·50835	·37709	1·13126	—	—	39973·252
C_2H_4	Olefiant gas	·58823	·08403	·50420	—	—	13235·629
CO	Carbonic oxide	·48488	—	·18638	·24850	—	1907·620
CO_2	Carbonic acid	·22846	—	·06231	·16615	—	—
4N+O	Air	·14995	—	—	·03332	·11663	—
H_2O	Vapour of water	·04662	·00518	—	·04144	—	—
—	Coal gas	3·18989	·69970	1·88415	·46941	·11663	69705·647

We can now proceed to draw a few deductions from these tabulated facts.

Correspondence.

USEFUL RULES FOR GAS ENGINEERS.

SIR,—In order to shorten the laborious calculation necessary to obtain the distance between the centres of two columns of a gasholder, the length of girders, &c., I have worked out the following table of constants, which I think will be found of great assistance to many of your readers. I have also added, for reference, the most reliable rule for obtaining the length of the arc formed by the crown of the gasholder.

65, *Pigott Street, London, March* 1, 1879. FRED. S. CRIPPS.

RULE I.—To find the distance between the centres of two columns of a gasholder, given the diameter of the column circle, and the number of columns. Multiply the diameter by the constant opposite the number of columns, and the product will be the distance from centre to centre required:—

No. of Columns.	Constant.	Log. of Constant.
3	·866025	T·9375304
4	·707107	T·8494851
5	·587785	T·7692185
6	·500000	T·698970
7	·433883	T·637373
8	·382683	T·5828392
9	·342020	T·5340515
10	·309017	T·4899824
11	·281732	T·449837
12	·258814	T·412996
13	·239315	T·378971
14	·222521	T·347371
15	·207912	T·3178796
16	·195090	T·290236
17	·183749	T·264226
18	·173648	T·239670
19	·164594	T·216416
20	·156434	T·194332
21	·149042	T·173309
22	·142315	T·153251
23	·136166	T·134071
24	·130526	T·115698

RULE II.—To find the new length of arc which forms the crown of a gasholder, given the height or *rise* in the centre, and the *diameter* of the gasholder:—

Let A = half the diameter.
B = rise.
R = radius of arc.

Then $\frac{A_2 + B_2}{2B} = R$ and $\frac{A}{R}$ = sine of half the angle subtended by the arc.

From a table of sines obtain the angle corresponding to *this* sine in degrees and decimals of a degree. Then multiply this angle, the radius R and the constant ·03490658 together, the result will be the correct length of the *arc*.

MR. METHVEN'S PROPOSED PHOTOMETRIC STANDARD.

SIR,—By some error the figures given as illuminating power in my experiments with Mr. Methven's standard, as published in the last number of the JOURNAL, are wrongly put. While the per centages stand right, cyphers have been inserted in the first decimal places instead of in the second.

This is how the figures should have been printed:—

First Series.

Common gas as standard, illuminating power 7·30 candles.
Cannel gas as standard, illuminating power . 7·40 „
Difference, 1·3 per cent.

Second Series.

Common gas as standard, illuminating power 7·20 candles.
Cannel gas as standard, illuminating power . 7·38 „
Difference, 2·5 per cent.

Third Series.

Common gas reduced to 3·75 *cubic feet consumption per hour.*

Common gas as standard, illuminating power 4·10 candles.
Cannel gas as standard, illuminating power . 4·16 „
Difference, 1·46 per cent.

55, *Millbank Street, S.W., March* 12, 1879. F. W. HARTLEY.

THE VISIT OF THE BRITISH ASSOCIATION OF GAS MANAGERS TO NEWCASTLE.

SIR,—Referring to the meeting of the British Association of Gas Managers at Newcastle-on-Tyne in June next, I beg to call the attention of the Committee of the Association to a subject, which, if properly worked, may be advantageous to the members attending.

The Railway Companies are in the habit of issuing tourist-tickets at a reduced price during the summer months, but I have not heard that gas managers have hitherto been able to avail themselves of this privilege. At all events, in 1875, when the meeting was held at Leeds, I made inquiries, and found that such tickets were not issued for that journey.

Now, I would suggest that the Committee ask the various Railway Companies to issue to members of the Association, tickets available for the return journey within a fortnight, at a rate similar to that charged to tourists, each member, if he choose, to be allowed to take two tickets, as some may wish their wives to accompany them, and others may take a friend.

Considering that the gas interest is one of very great importance in this country, and that the various materials used in its manufacture and distribution necessitate a large amount of traffic over all the railways of the United Kingdom, I feel assured that the Directors and Managers, if asked, would not object to some arrangement in favour of those in the employ of Gas Companies. The Railway Companies themselves would undoubtedly benefit by such an arrangement, as numbers who would otherwise remain at home, would, if they could do the double journey for a little more than single fare, avail themselves of so favourable an opportunity of visiting the Northern Metropolis.

Gas-Works, Bodmin, March 5, 1879. JAMES THOMAS.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, MARCH 10.

The Llandudno Improvement and the West Kent Main Sewerage Bills were referred to a Select Committee, consisting of Lord Strafford (Chairman), Earl Vane, the Marquis of Northampton, Lord Thurlow, and Lord Heytesbury; to meet on Thursday, March 13.

A petition was presented against the Colwyn Bay and Pwllycrochon Estate Bill from Alfred Asten Walker and others.

FRIDAY, MARCH 14.

West Kent Main Sewerage Board Bill.—Report from the Select Committee, That the Committee had not proceeded with the consideration of the Bill, the opposition thereto having been withdrawn, read.

Llandudno Improvement Bill,—reported from the Select Committee.

Colwyn Bay and Pwllycrochon Estate Bill,—committed.

A petition against the Colwyn Bay and Pwllycrochon Estate Bill was presented from the London and North-Western Railway Company.

HOUSE OF COMMONS.

MONDAY, MARCH 10.

The following Bills were read a second time, and committed:—Alliance and Dublin Consumers Gas; Bury St. Edmund's Gas; Colchester Water; New River Company.

The Examiners reported that Standing Order No. 62 had been complied with in the case of the Lancaster Gas Bill.

Petitions against the following Bills were presented:—Colchester Water, from Corporation of Colchester; Manchester Corporation Water, from Corporation of Bolton (against alterations); Rotherham Borough, from (1) Greasbrough Local Board, (2) John Brown and Co., Limited, (3) Churchwardens, &c., of Whiston, (4) Owners of lands and property in Whiston, (5) Overseers of, and owners of property in Brinsworth.

TUESDAY, MARCH 11.

Nelson Local Board Bill.—The Standing Orders Committee reported that Standing Order No. 129 ought to be dispensed with in the case of the petition of Messrs. Towneley, Parker, Holden, and Briggs, against this Bill.

Requisitions to withdraw petitions against the following Bills were presented:—Imperial Continental Gas Association, from the Postmaster-General; New River Company, from Corporation of London; Tipton Local Board, from the Postmaster-General.

The Aldrington Water, Westgate and Birchington Gas and Water, Brighton and Hove Gas, and Portsmouth Water Bills were referred to a Select Committee, consisting of Mr. Assheton (Chairman), Mr. W. E. Price, Lord Charles Bruce, Colonel Drummond-Moray, and Sir John Duckworth (Referee); to meet on Tuesday, March 18.

The Birmingham Corporation Water, Birmingham Gas, Tipton Local Board, Nottingham Water, and Glossop Gas Bills were referred to a Select Committee, consisting of Mr. C. W. Wynne (Chairman), Colonel Windsor Clive, Mr. W. James, and Mr. Courtauld; to meet on Tuesday, March 18.

The Nelson Local Board, Rawmarsh Local Board, Pemberton Local Board, Dearne Valley Water, Manchester Corporation Water, Leeds Corporation, and Rotherham Borough Bills were referred to a Select Committee, consisting of Sir John St. Aubyn (Chairman), Mr. Cordes, Colonel Makins, and the Marquis of Tavistock; to meet on Wednesday, March 19.

THE LIVERPOOL LIGHTING BILL.

On the order for the second reading of this Bill,

The CHAIRMAN of WAYS and MEANS (Mr. Raikes) said that, after the Bill had been read a second time, he would propose a motion in terms which stood upon the paper, with a view of referring the Bill to a hybrid Committee, in order that some definite principles might be laid down as to the form legislation should take with regard to Bills of this character. There were before the House in the present session no fewer than 34 Bills, in which it was proposed to employ the electric light, or some other improved mode of illumination, and he thought it would be highly inconvenient to submit these various schemes to private Bill Committees, and so run the risk of reproducing something like the chaos which for many years prevailed in regard to gas legislation. The first Metropolitan Gas Act—that of the Chartered Company—was passed in the year 1810, and the first Gas Act relating to the country was passed in 1818, and had reference to Bath. From that time—owing to a sort of happy-go-lucky system which seemed then to prevail with regard to the mode of conducting the private business of the House—several hundreds of Gas Acts had been passed, which were based upon very various principles, and which dealt with the question in different ways. In consequence of that, a good deal of confusion had since prevailed as to the precise rights and powers of gas companies, and the precise powers of parliamentary committees. That being so, he ventured to think that when proposals were brought forward for introducing a great change in the system of public lighting, the House would do well to take care that there should be something like a universal system of legislation. There was no Bill before Parliament this session, relating to the Metropolis Gas Companies, which raised the question, and therefore it appeared to him that the second reading of the Liverpool Lighting Bill, which was one of very great importance, affecting, as it did, a large population, and was promoted by a powerful Municipality, would afford a very suitable opportunity for raising the question as to what should be done. He might say that he had in view another Bill, affecting another very large and important constituency, which was not yet down for second reading, but in which the promoters were the Gas Company, whilst the opponents were the Corporation. If that Bill came forward, he hoped they would be able to refer it likewise to the same Committee. The Committee would then have before them two alternative modes of procedure—viz., a scheme promoted by a corporation and opposed by a gas company, and a scheme in which the position was reversed, the gas company being the promoters and the corporation the opposers. That, he thought, would be sufficient to thresh out the different questions which were likely to arise before the Committee, and the House would see that he proposed to give the Committee rather a large order of reference, to enable them to lay down, if they thought proper, any canons which it would be well to follow in dealing with the question hereafter. With regard to the constitution of the Committee, he had been in communication with several honourable members, with a view to their serving on it, and the reasons for a careful selection were such as he felt sure the House would be able to appreciate. He hoped in the course of a few days to be able to place before them a list of names which he knew would command the confidence of the House in dealing with a question of this kind, which was one of the highest scientific interest, and of great practical importance to the country. He should, therefore, on this occasion, simply support the second reading of the Bill, but with a proviso that as soon as it was read a second time he should propose the motion which stood in his name.

The Bill was then read a second time.

The motion of Mr. Raikes stood upon the paper as follows:—"That the Bill be committed to a Select Committee of seven members, four to be appointed by the House, and three by the Committee of Selection: That it be an instruction to the Committee that they have power to inquire whether it is desirable to authorize any schemes for lighting by electricity, or other improved methods, in thoroughfares and other places; to consider how far, and under what conditions, if at all, the use of such modes of lighting should be sanctioned by Parliament in the case of Municipal Corporations, other Local Authorities, or Public Companies; and to report their opinion to the House; and that such of the petitioners against the Bill as pray to be heard by themselves, their counsel, or agents, be heard upon their petitions (if presented on or before the 17th day of March), and counsel heard in favour of the Bill against such petitions: That the Committee have power to send for persons, papers, and records: That four be the quorum of the Committee."

Mr. RAIKES said he moved the motion as it stood, except that he wished to omit the words "in thoroughfares and other places," because it had been intimated to him that there were localities, such as factories, theatres, schools, churches, and other places, which, in the opinion of the Board of Trade, could not be regarded as public places, and it was not desirable to restrict the inquiry in any way.

The motion, as amended, was then agreed to.

WEDNESDAY, MARCH 12.

A petition was presented against the Nottingham Water Bill, from the Corporation of Nottingham (against alterations).

A requisition to withdraw his petition against the Bury St. Edmund's Gas Bill was presented from the Postmaster-General.

THURSDAY, MARCH 13.

Liverpool Lighting Bill.—The following members were nominated by the House to serve on the Select Committee to consider this Bill:—Lord Lindsay, Mr. Adam, Sir Ughtred Kay-Shuttleworth, and Mr. Spencer Stanhope.

Belfast Water Bill.—A petition was presented against dispensing with Standing Order 129 in the case of the petition of Owners and occupiers of property in Belfast.

Westgate and Birchington Gas and Water Bill.—The *locus standi* of the following petitioners was disallowed:—(1) Margate and Broadstairs Water-Works Company, except as against clause 4, (2) Owners, &c., of houses at or near, and consumers of gas in Westgate and Birchington.

Tipton Local Board Bill.—The *locus standi* of the Corporation of Birmingham was disallowed, except as against clauses.

Sir U. KAY-SHUTTLEWORTH gave notice that on Monday, March 17, he would ask the President of the Local Government Board, whether it is true that the Registrar-General has reported that the death-rate of the Metropolis, which was 22·3 in every 1000 in 1876, and 21·9 in 1877, has risen in 1878 to 23·5 in every 1000, and in recent weeks to a much higher figure: Whether this increase was almost entirely due to zymotic diseases: Whether Dr. Frankland has reported that during the past year the quality of the water delivered by the Companies who derive their supply from the Thames was inferior even to the unsatisfactory water supply of recent years; and whether the Local Government Board have taken any action in consequence of these reports.

FRIDAY, MARCH 14.

Imperial Continental Gas Association Bill.—The Examiner reported that Standing Order No. 62 had been complied with.

A requisition to withdraw their petition against the Birmingham Corporation Water Bill was presented from Holders of Birmingham Corporation Water Annuities.

Liverpool Lighting Bill.—The following members were added by the Committee of Selection to the Select Committee on this Bill:—Mr. Thomas Bruce, Mr. Lyon Playfair, and Mr. Christopher Talbot. Committee to meet on Monday, March 24.

SATURDAY, MARCH 15.

A petition against the Liverpool Lighting Bill was presented from the Liverpool United Gaslight Company.

The petitions were withdrawn of the Postmaster-General against the Brighton and Hove Gas Bill, of Francis George Foster against the Portsmouth Water Bill, and of the Corporation of Birmingham against the Tipton Local Board Bill.

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

FRIDAY, MARCH 7.

(*Before Justice* FRY.)

SWANSTON *v.* TWICKENHAM LOCAL BOARD OF HEALTH.

The plaintiff, Mr. Swanston, was the owner of a considerable portion of the land abutting on the south side of a public road in Twickenham, known as Station Road. The defendants, the Local Board of Twickenham, had constructed under that road a deep sewer, nearly 30 feet from the surface, and they had made on the plaintiff's land, adjoining the road, a side entrance, or "man-hole," which consisted of a large brick shaft nearly 30 feet deep, imperfectly covered at the top by a large iron plate, but allowing the sewer gases to escape all round it. The effect of this structure, as the plaintiff alleged, was to prevent his tenants from using the land on which it stood, and the defendants claimed to have a perpetual right to go upon the plaintiff's adjoining land, for the purpose of descending the shaft and bringing sewage up. The plaintiff's tenants complained that an intolerable stench and sickness were caused by this opening, and that cases of fever had broken out in consequence thereof. The defendants had lately served the plaintiff with a notice that they intended to erect two other similar structures on his land, by which great damage would be caused to his property. The plaintiff, therefore, claimed an injunction to restrain the defendants from continuing the said man-hole in Station Road on his land, and to restrain them from constructing any other such side entrances to the sewers on any part of his land.

Mr. HIGGINS, Q.C., and Mr. E. J. PAYNE appeared for the plaintiff, and submitted that the defendants had no power, under the Public Health Act of 1875, to construct the side entrance, or man-hole, into the sewers, without purchasing his land upon which such entrance was made. The only power they had was to carry a sewer through, across, or under any turnpike road, street, or place intended for a street; but they could not make such entrances as these.

Mr. J. PEARSON, Q.C., and Mr. P. HAWKINS, for the defendants, contended that they had ample power to do what they had done, and all the plaintiff could claim was compensation for any damage that might be caused by the works constructed by the defendants.

Justice FRY was of opinion that under the clauses of the Act giving the defendants power to make sewers there was no power to construct these side entrances, or man-holes. If it were necessary for the purpose of the

sewer to have such entrances, then the defendants must purchase the land under their compulsory powers. It would be most inconvenient and objectionable if the defendants had the power they claimed of entering at all times upon the plaintiff's land for the purpose of using the man-hole, and he did not think that such a power was a subject of compensation under the clauses of the Public Health Act. The allegations as to damage arising from the structure complained of were rather vague; but he rested his judgment on the fact that the defendants had no power to make such man-holes. He should, therefore, grant an injunction in the terms of the claim; but the order would not be enforced for six months, to enable the defendants to make such alterations in their works as they might think fit.

SELLING COKE BY MEASURE.—At the Heywood Petty Sessions on Wednesday, the 5th inst., John Waddington was summoned for selling coke by measure on the 21st of February.—Constable Corkhill said he saw defendant selling coke by measure on this date. He was selling it in bags, which, he said, contained half a hundredweight.—Defendant said he had forgotten his scales that morning, and all the bags had been weighed before he left the gas-works.—A fine of 2s. 6d. and costs was inflicted.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

THE IMPROVED LIGHTING OF QUEEN VICTORIA STREET.—The lighting of this street by some of Sugg's improved lanterns and burners has now been effectually completed. There have been fixed twenty-six 80-candle burners on the pathways; four 80-candle burners on the refuge, and five 200-candle burners on the refuges opposite the Mansion House Station, Budge Row, and at the corner of Queen Victoria Street and the Poultry. The total candle power of these lamps is as follows:—

		Feet.		Candles.
Thirty 80-candle burners at 22 feet	equal	660	equal	2400
Five 200-candle burners at 50 feet	„	250	„	1000
		910	equal	3400

The cost, at 3s. 6d. per 1000 feet, is 38·22d. for the whole of the street, or a light of 88·95 candles for 1d. per hour. This lighting, with common gas, is slightly superior in point of cost to that at Waterloo Place, Pall Mall, the figures for which stand as follows:—Forty-three 80-candle burners, each consuming 19 feet of cannel gas; and two 200-candle burners, consuming 45 feet each, say:

		Feet.		Candles.
Forty-three 80-candle burners at 19 feet	equal	837	equal	3440
Two 200-candle burners at 45 feet.	„	90	„	400
		927	equal	3840

Cost, at 4s. 4d. per 1000 feet, 3s. 7¼d. for the lighting of the entire street, or 88·24 candles at a cost of 1d. per hour.

LARGE GAS-LAMPS AT WESTMINSTER BRIDGE.—The Chartered Gas Company have erected at the refuge, on the north side of Westminster Bridge, four very powerful gas lights, which were shown for the first time last Thursday evening. The burners are Wigham's patent, being the same as those used in lighthouses, and also for the signal light on the clock tower of the Houses of Parliament. These burners consist of a number of fish-tail jets placed close together, so that the upper extremities of their flames touch each other, producing an increased light, greatly beyond the multiple of their single flames. To obviate the smoke which is caused by the combination of so many gas-jets, an oxidizer of talc is suspended over the flame, by means of which a current of air is brought in contact with its most smoky part, rendering it not only smokeless but exceedingly white. The combustion is also assisted by a bottom cone, for equalizing the current of air to the flame. The oxygen of the air is thus twice utilized—first at the bottom of the flame, through the medium of the several fishtail burners; and, secondly, at the top of it, where its action raises to a white heat the large quantity of solid carbon found there. The illuminating power of each burner is equal to about 400 sperm candles, with a consumption of about 60 feet of gas per hour. The burners are enclosed in lanterns, glazed with opal and muffed glass. Both the lanterns and burners are made by Messrs. Edmundson and Co., of Westminster and Dublin.

METROPOLIS WATER SUPPLY.

The Registrar-General publishes the following report on the average daily quantity of water supplied to London during February, 1879. According to the returns furnished to him by the Metropolitan Water Companies, 129,941,836 gallons, or 590,385 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight) were supplied daily; or 233 gallons (105·9 decalitres), rather less than a *ton* by weight, to each house, and 82·9 gallons (14·9 decalitres) to each person, against 80·5 gallons during February, 1878.

Companies.	Number of Houses, &c., supplied in Feb., 1878.	Number of Houses, &c., supplied in Feb., 1879.	Aver. Daily Supply of Water in Gallons* during Feb., 1878.	Aver. Daily Supply of Water in Gallons* during Feb., 1879.
Total supply	541,779	557,059	117,265,890	129,941,836
From Thames	254,964	263,026	56,506,255	64,975,478
„ Lea and other Sources	286,815	294,033	58,759,635	64,966,358
THAMES.				
Chelsea	28,859	29,562	7,540,200	7,540,200
West Middlesex	50,260	51,614	8,935,187	9,965,325
Southwark and Vauxhall	79,809	82,470	18,400,000	23,581,476
Grand Junction	87,910	38,089	11,183,668	10,999,983
Lambeth	58,126	60,371	12,447,200	12,888,500
LEA AND OTHER SOURCES.				
New River	126,240	127,916	25,501,000	26,136,000
East London	115,143	118,910	26,136,800	30,827,800
Kent	45,432	47,227	7,121,835	8,002,558

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for Feb., 1879, as compared with that for the corresponding month of 1878, shows an increase of 15,280 houses, and of 12,675,946 gallons of water supplied daily.

The following is Dr. Frankland's report on his analyses of the Metropolitan Water Supply during February, 1879:—

"Taking the average amount of organic impurity contained in a given volume of the Kent Company's water during the nine years ending December, 1876, as unity, the proportional amount contained in an equal volume of water supplied by each of the Metropolitan Water Companies, and by the Tottenham Local Board of Health, was—Colne Valley, 1·6; Kent, 1·8; Tottenham, 2·5; Chelsea, 3·9; New River, 4·8; East London, 5·2; West Middlesex, 6·8; Grand Junction, 6·4; Southwark, 7·5; Lambeth, 7·7. The water taken from the Thames by the West Middlesex, Southwark, Grand Junction, and Lambeth Companies was much polluted by organic matter, and was unfit for dietetic purposes. The Southwark, Grand Junction, and Lambeth Companies did not efficiently filter this impure water before delivery. The water drawn from the same source by the Chelsea Company was of much better quality, and was efficiently filtered. The water taken from the Lea by the New River and East London Companies, though efficiently filtered, was inferior in quality to that distributed by the Chelsea Company. The deep-well water delivered by the Kent and Colne Valley Companies was clear, and of its usual excellent quality for dietetic purposes; but the water obtained from the same source, and supplied by the Tottenham Local Board of Health, was not quite clear. It was slightly contaminated by organic matter, and contained no nitrates or nitrites. Seen through a stratum two feet deep, the waters presented the following appearances:—Kent and Colne Valley, clear and colourless; Tottenham, very slightly turbid, colourless; New River, East London, and Chelsea, clear and pale yellow; West Middlesex, clear and yellow; Southwark and Lambeth, slightly turbid and yellow; Grand Junction, slightly turbid and brownish yellow."

Results of Analyses expressed in Parts per 100,000.

Companies or Local Authorities.	Total Solid Matters.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen, as Nitrates and Nitrites.	Total combined Nitrogen.	Chlorine.	Total Hardness.
Inner Circle.								
Thames—								
Chelsea	30·62	·105	·038	0	·237	·275	1·5	20·9
West Middlesex	28·99	·331	·041	0	·236	·277	1·5	19·1
Southwark	27·20	·388	·056	0	·146	·202	1·5	17·7
Grand Junction	29·04	·337	·043	0	·157	·200	1·6	18·9
Lambeth	31·40	·396	·056	0	·202	·258	1·7	20·0
Other Sources—								
New River	31·24	·214	·037	0	·317	·354	1·5	20·9
East London	34·00	·257	·052	0	·229	·281	1·7	22·4
Kent	45·10	·090	·019	0	·388	·407	2·5	29·4
Outer Circle.								
Colne Valley	11·96	·071	·021	·003	·267	·291	1·4	5·4
Tottenham Local Board	40·96	·121	·025	·056	·000	·071	2·8	27·8
Corporation of Birmingham*	22·00	·241	·054	·004	·220	·277	1·5	15·6
Corporation of Glasgow†	2·96	·135	·018	0	·007	·025	0·35	1·03

* Analyzed by Dr. Alfred Hill, Medical Officer of Health and Analyst to the Borough.
† Analyzed by Dr. E. J. Mills, F.R.S., of Anderson's College, Glasgow.

Note.—The numbers in the analytical table can be converted into grains per imperial gallon by multiplying them by seven, and then moving the decimal point one place to the left. The same operation transforms the hardness in the table into degrees of hardness on Clark's scale.

HARROW DISTRICT GAS COMPANY.

The Half-Yearly General Meeting of this Company was held at the Guildhall Tavern, London, on Monday, the 10th inst.—JAMES GLAISHER, Esq., F.R.S., in the chair.

The SECRETARY and ENGINEER (Mr. J. L. Chapman) having read the notice convening the meeting, the following report and accounts were presented:—

The Directors have the pleasure to report the continued and steady improvement of the position of the Company, as will be seen from the accompanying statement of accounts.

The gas-rental continues steadily to increase, the half year being £181 more than the corresponding period of last year.

The balance of the profit and loss account shows a total of £1139 14s. 6d. for disposal. The Directors recommend that a dividend at the rate of 6 per cent. per annum be paid (free of income-tax), and that £200 be written off the parliamentary expenses, which will leave a balance of £32 18s. 6d. to be carried forward to the next account.

Two Directors, Mr. Charles Horsley and Mr. Thomas C. Hudson, and one Auditor, Mr. James Randall, retire by rotation, who, being eligible for re-election, offer themselves accordingly.

Revenue Account, for the Half Year ended Dec. 31, 1878.

Dr.				Cr.		
Manufacture of gas—				Sale of gas—		
Coals, including all expenses	£1233	13	0	Michaelmas quarter—		
Purifying materials, water, oil, &c.	38	7	7	Private rental—		
Salary of Engineer	100	0	0	2,319,000 cubic feet at 6s.	£695	13	1
Wages	226	16	9	279,000 cubic feet at 6s. 3d.	87	3	9
Works, machines, and apparatus—maintenance of, repairs, and labour	206	2	0	Public rental and under contracts	70	17	6
Distribution of gas—				Christmas quarter—			
Mains and service-pipes, repairs, maintenance, renewal, and labour	86	0	10	Private rental—			
Meters, renewing, repairing, and refixing	16	8	1	6,199,700 cubic feet at 6s.	1930	18	4
Public lamps—				784,600 cubic feet at 6s. 3d.	245	3	11
Lighting	25	10	0	Public rental and under contracts	173	11	6
Rents, rates, and taxes—				Meter-rental, half year	75	0	0
Rents	16	17	6	Residual products—			
Rates and taxes	136	8	1	Coke, less labour and carriage	345	4	3
Management—				Tar, do., do.	69	11	0
Directors and Auditors allowances	110	10	0	Liquor	57	10	0
Salary of Secretary	25	0	0	Transfer fees	0	17	6
Collector's commission	30	0	0				
Stationery and printing	14	11	9				
General establishment charges	78	16	2				
Sundries—							
Bad debts	13	9	4				
Total expenditure	£2360	11	1				
Balance carried to profit and loss account	1318	19	9				
	£3679	10	10		£3679	10	10

The CHAIRMAN, in moving the adoption of the report, said: I think, gentlemen, there is but little that I need say to you. The balance-sheet gives you information as to our exact position at the present time, and I think it may be taken as being a very satisfactory one. The first sentence in our report speaks of the Company's continued and steady improvement. Our progress is slow, as we might fairly expect it would be in a district like Harrow; but it certainly seems to be sure, for there has been no check to it from our first starting to the present time. In our report, we have not alluded to the official gas-testing, for the Local Authorities have not tested our gas on one occasion since I had the pleasure of meeting you last year. I infer from this that they are perfectly satisfied with its quality. Of that quality I can speak, because a testing is made daily, the results being sent

to me week by week, and on many occasions I have found the illuminating power has been 17 candles. During the very severe winter through which we have just passed, it was at times under 15 candles; but its average illuminating power since we last met has been fully 15¼ candles. Now that every attention is paid to the purification of gas, and it having an average quality such as I have stated, we were quite prepared for an examination whenever the Authorities might have thought fit to make one. I am sure you will be pleased to find that the article supplied by the Company is one with which we should all be satisfied. I believe that there has not been a single complaint, and it seems from that that the quality of our gas has been satisfactory to the consumers as well as to ourselves. When we met last year we were just preparing for the electric light "scare." The history of gas companies since then has been very serious, in consequence of that scare. I am very glad to be able to tell you that we have only lost one of our proprietors through it; therefore the Shareholders have displayed confidence in the concern during the past year, and I think that the results shown to-day will confirm them in that confidence. [The Chairman then referred at some length to the electric lighting experiments at Westgate-on-Sea, and at the works of the Chartered Gas Company; quoting from the reports of Messrs. Bennett and Valon and the Committee of the Chartered Gas Company, which have already appeared in the JOURNAL, to show that the nature of the electric light rendered it unsuitable for purposes of ordinary illumination, while its cost would be a serious impediment to its general introduction as a substitute for gas.] It is very plain that the expense of the electric light is so much greater than gas that it will be a long time before that light could either rival or supersede gas. But good may come out of that which seemed to be evil, for we have had experiments in improved lighting with gas. The first Company who carried these out was the Phœnix, and our thanks are due to Mr. Woodall, their Engineer, for the beautiful illumination he has given us in the Waterloo Road. The light produced is equal to the electric light in its brilliancy, and it is thrown where it is most required—that is, on the ground. We have since had some experiments in Waterloo Place and in Queen Victoria Street. I was returning from Harrow on Saturday night last, and the light was so good that I could have picked up a pin from the street, although there was bright moonlight at the time. I think, therefore, that gas has undoubtedly a great future before it. I am unable to join in the complaints so generally made of the badness of the lighting of our streets. Why are these complaints made? Simply because more light is needed at crossings, and the vestries have put the blame, if blame there be, for this state of things, upon the gas companies. Now, gas companies have been supplying the full, and in some cases more than the full quantity of gas for which they have been paid. The vestries have ordered a certain amount of gas, and no more. Mr. Woodall's experiments, however, have given us a proof that gas, if supplied in sufficient quantity, will light our streets as efficiently as, in many parts, it is absolutely necessary they should be lighted. I have no doubt, therefore, that the result of the recent scare will be a better illumination of the streets in the future. Then, again, we are indebted to Mr. Sugg for his beautiful new burners. I have frequently said that gas companies supply good gas, but that it is not properly used in the houses. There has been an improvement in this respect in Harrow; still I am always urging upon people that they should look to the nipples of their gas-burners. Mr. Sugg, in demonstrating that gas will give a softer and better light with his new burners, has done more good than we could do in many years by urging attention to this matter. He has also proved that, by their use, perfect combustion is ensured, and, consequently, no unconsumed gas passes into the apartment. Herein lies the difference between properly used and improperly used gas. I do not know that I need trouble you further with any remarks upon this subject. I only wished to show that we may still have confidence in our undertaking, and that only prudent management is required to make it a success.

The DEPUTY-CHAIRMAN (Mr. John Chapman), in seconding the resolution, said he agreed with Mr. Glaisher that the Company were progressing, and that there was every prospect that the progress would be continuous. The extension of the Metropolitan Railway to Harrow would probably be finished by next year, and the Bill for authorizing the construction of a line to Pinner had had a second reading, which seemed to indicate that the railway would come to Harrow. There was also a prospect of a line being made to Ealing, to complete the Metropolitan Outer Circle. Hence the district might be overdone with railways, but that would not hurt the gas companies. He believed coals would be cheaper in consequence.

Mr. RANDALL said that in the report for the quarter ending June last the rates and taxes were charged at £68 9s. 8d. In the present account they were £136 8s. 1d.—something like double the former amount.

The CHAIRMAN explained that the School Board rate had come into that half of the year; and it was further stated that an appeal had been made on the subject, the result being that a portion of the rate had been taken off.

Mr. WOODALL asked whether the price paid for coals at Harrow was not unnecessarily high.

The CHAIRMAN said that the coal cost 4s. for being carried three miles. They hoped that the new railway would lessen that expense by one-half. They obtained their coal as cheaply as they could.

Mr. WOODALL hoped that when the railway came nearer the works the result would be apparent in an increased make of gas per ton of coal carbonized.

The CHAIRMAN said they now obtained 9600 feet of gas per ton of coal. He did not want their Engineer to get much more than that, as to do so would reduce the illuminating power of the gas.

Mr. WOODALL said that when coals were at a very high price it was specially desirable to get as much as possible out of them. The capital of the Company was very high, and it was necessary that particular attention should be paid to every detail, in order that they might maintain, and, if possible, surpass the results which had been already shown.

The CHAIRMAN said that the Directors were reducing their capital by paying off the parliamentary expenses, and in every possible way. The points which Mr. Woodall had mentioned would certainly be considered; but the Directors looked to the railway to do a great deal.

Mr. HORSLEY said he believed that the coals cost 5s. or 5s. 6d. to deliver in the retort-house.

The SECRETARY said that the cost was 7s.

The resolution for the adoption of the report and accounts was then put, and carried unanimously.

On the motion of the CHAIRMAN, it was then agreed—"That a dividend at the rate of 6 per cent. per annum be now declared and paid, free of income-tax, and that £200 be written off the parliamentary expenses."

On the motion of the CHAIRMAN, seconded by Mr. MAGNUS OHREN, Mr. Charles Horsley and Mr. Thomas C. Hudson were unanimously re-elected Directors of the Company.

Mr. HORSLEY, in returning thanks, said that, although the progress of the Company had been slow, it had been satisfactory. They did not sell so much gas as they ought to do; but they were looking for a greater consumption by going farther afield, and he thought there would be a good return.

Mr. HUDSON, in acknowledging his re-election, said that he believed the Company were going on steadily and satisfactorily. Harrow was enlarging every month, and he thought there was every prospect of the Company being prosperous. He did not think that the electric light would ever put out the Harrow gas. He, with another Director of the Company, went to Paris to see the electric light, and his opinion was that it was too expensive ever to kill the gas at Harrow.

The CHAIRMAN proposed the re-election of Mr. James Randall, the retiring Auditor.

Major CARTWRIGHT seconded the proposition. He said that they must recollect that in an auditor for a gas company they wanted, not only an accountant, but a person who had special knowledge of gas work. The Company had in their present Auditors men who possessed that special knowledge, and he really thought that such knowledge ought to be met by a fair and liberal remuneration. He found from their accounts that the Auditors received only ten guineas for their work. He looked upon that as very small payment for duties requiring special knowledge, and he should move that the remuneration be increased to fifteen guineas.

The CHAIRMAN said by the Company's Act of Parliament no more money could be granted to the Directors and Auditors, however much the business might increase.

Mr. Randall was then unanimously re-elected as Auditor.

Mr. RANDALL, in returning thanks for his re-election, said he could congratulate his fellow-shareholders upon the healthy state of the Company's rental. About two years ago, he had occasion to speak of the arrears of the rental. Those arrears had now been reduced to £50 up to the 31st of December. That amount would represent the arrears of the Michaelmas quarter. He called that a very healthy condition of things, especially taking into consideration the wide district which the Company served, and the great difficulties which had been experienced in getting in money during the past winter. He hoped the Directors would take notice of what Mr. Woodall had said with regard to the cost of delivering the coal at Harrow. The figures given by Mr. Chapman showed that the cost of cartage amounted to 6d. per 1000 feet of gas. They would have to cheapen their gas sooner or later. The cost of coal was one of the directions in which they must look for the means of effecting that reduction. If the Company could get their raw material more cheaply, they would be able to sell their product more cheaply.

The CHAIRMAN said that no subject had been so frequently before the Directors as the price of coal.

Mr. W. W. BAYNES proposed, and Mr. WOODALL seconded, a vote of thanks to the Directors for their services, and it was carried unanimously.

The CHAIRMAN, in acknowledging the vote, said he was so well supported in every way that he was certain the Directors would spare no effort in the future to make the Company a success. They were thankful for any suggestions which were made to them, and those suggestions should have full consideration.

Mr. A. H. BAYNES proposed that a vote of thanks be given to Mr. James L. Chapman, the Company's Manager and Engineer, for his faithful and valuable services during the half year. In Mr. Chapman they had a Manager who developed with the growth of the Company, and one who had in him the capacity for any amount of future development. Mr. Chapman was always first and foremost in bringing forward any improvement, or in acting upon any suggestion, and the Shareholders were very much indebted to him.

The CHAIRMAN seconded the motion with great pleasure. They must recollect that their Engineer was the money getter, and he discharged his duties with intelligence and earnestness. He also kept himself quit *au fait* with regard to the improvements of the period.

The motion was carried unanimously.

Mr. CHAPMAN said that he was exceedingly obliged to the meeting for their kindness. While coming to town he had been thinking that he had two causes of satisfaction and two of dissatisfaction. The first cause of dissatisfaction was that there was not a better dividend for the Shareholders, and the other was that the price of gas was not lower. He hoped, however, that, if the railway came, that cause of complaint would soon be removed. Of the causes of satisfaction, the first was that the present Shareholders were nearly all original Shareholders, and that therefore they were getting as much interest for their money as they could, at the present moment, if they went and bought gas stock. The other cause of satisfaction was that the consumers had been so pleased with the gas, that the Local Authority had not once sent an official tester during the past year.

Votes of thanks were then passed to the Chairman and Auditors, and the proceedings terminated.

HASTINGS AND ST. LEONARDS GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Thursday, the 6th inst.—Mr. GEORGE SCRIVENS in the chair.

The SECRETARY (Mr. W. W. Young) read the notice convening the meeting, and the following report was presented:—

The new lift to the large gasholder, alluded to in the last two reports, has been successfully at work during the past winter, and has enabled the Company to keep up a supply of gas of the highest efficiency, which, considering the large increase called for during the last six months, could not have been effected without this addition. The addition to the Company's purifiers, named in the last report, has been arranged for, and will be proceeded with early this spring.

Your Directors have continued to carefully watch the whole of the details connected with electric lighting during the past six months, having been efficiently supplied by their Manager, Mr. A. H. Wood, at every meeting, with the fullest information respecting it; and although they intend still to give every attention to whatever new invention may present itself, they are of opinion that there is at present nothing to fear and nothing to gain from it, either as an opponent or a friend.

The accounts, duly audited, leave a balance of £3997 6s. 8d. for the past half year, which, with the amount of £139 14s. 3d. brought forward, gives the sum of £4137 0s. 11d. to be dealt with by the Shareholders; and it is proposed to pay a dividend of 10 per cent. per annum on the £25 shares, and a dividend at the rate of 7 per cent. per annum on the £20 shares; amounting together to £3637 10s., and leaving a balance of £499 10s. 11d. to be carried forward to the next account.

The CHAIRMAN, in moving the adoption of the report, said he hoped the Shareholders would agree with him that it was a satisfactory one, and that the position and prospects of the Company, as therein set out, were encouraging. The Directors could safely state that the works were in good order. Nothing that had been required to be done in the way of restoration or repair had been omitted or deferred, except the new purifiers; but all mains, services, and works which had become defective had been replaced according as was necessary. During the dark days and long nights of winter—particularly of a cold one—much care was requisite in providing for a proper supply of gas, and during the past season Mr. Wood's resources had been heavily taxed, in consequence of the enormous and unprecedented increase in the consumption of gas. But, thanks to the large new telescopic gasholder, the supply had always equalled the demand. New purifiers—a rather heavy undertaking—were absolutely necessary, and as they would shortly be commenced, it might be reasonably hoped that they would be in working order before next winter. The coke produced had been sold as fast as made—a wiser policy, the Directors thought, than accumulating a large stock, particularly towards the end of the winter. A considerable increase had been made in the use of gas-stoves for cooking and heating, and in burning gas in common grates fitted

up to heat fire-clay or asbestos, and the Directors would be glad to see the system extended. The Shareholders would naturally expect some allusion to be made to the electric light, and he might assure them that the Directors had been constantly furnished with information as to the experiments made and their results. There might be places where, under particular conditions, the electric light could be introduced, and it was quite possible that improvement would be made in its production; but the question of cost, and the trouble it entailed as compared with gas, were not yet clearly defined. They had found that those persons who knew but little about the electric light had always been the most sanguine of its success; while practical men, who had studied the subject very carefully, considered that it would not materially interfere with the use of gas. The pamphlet on Electric Lighting, by Mr. Wood, was well worth the perusal of those who had not read it. In conclusion, he would remark that the accounts of the Company, duly audited, showed a balance of £4137 0s. 11d., out of which it was proposed to pay the usual dividends of 10 and 7 per cent., which would leave a balance of £499 10s. 11d. to be carried forward to next half year's account.

Mr. HOLDEN seconded the motion.

The MANAGER (Mr. A. H. Wood) said he might add to the objections already raised by the Chairman to the electric light, another argument against its general adoption, which seemed to have struck very few people, and that was that the electric light could not be stored. As it was produced, so it had to be burned; and if there was the slightest difficulty in it production, the light immediately went out, because the supply stopped the instant the production ceased. This was a great reason why the electric light could never replace gas; for, whether it were on the Thames Embankment or in the Albert Hall, the light at once went out when the production of electricity stopped from any cause. It was possible, however, to store the electricity in a Leyden jar, if it were made as large as a gasholder; but the instant it was tapped, the whole force would be at once let out. The electric light was also found to have an injurious influence on the eyes; and it had been asserted by medical men that a continued use of the light would cause permanent disease. He did not state these facts in opposition to the light, which he had investigated in an inquiring spirit, with a view of learning the truth, so as to be able to place the real facts before the Directors; and he could truly say that the report which he gave them last December on this subject, had been borne out almost in every particular. Then it had been proved again and again that the cost of lighting by electricity exceeded the cost of lighting by gas to the extent of five to one, so that the light which was obtained from 1s. worth of gas would cost 5s. if given by electricity. Under these circumstances, they need not fear the result of a competition between gas and electricity. The electric light might be used with advantage in some cases—such as at the Gaiety Theatre, in London, where it mattered little whether the cost were £5 or £1 foragood advertisement. It might also be adopted in large factories, and on wharves, or for excavations, harbour works, and lighthouses; but these purposes could not be considered in opposition to gas. All that gas companies had to do was to try and supply good gas at a cheap rate, and to cultivate all their undeveloped resources. If they did this, they never need fear the result of the electric light competition.

The motion for the adoption of the report was then put and agreed to.

Mr. WALDER proposed a vote of thanks to the Chairman, and, in doing so, said it was satisfactory to hear that the danger of the electric light superseding gas was not very great.

Mr. WOODHAMS seconded the motion, and it was carried.

The CHAIRMAN, in acknowledging the vote, remarked that he was one of their oldest Directors, and had always felt an interest in the Company. He was sure they did not stint anything in order to keep up the efficiency of the works, so that if their property were looked at by an impartial person, he must admit that everything was, as it ought to be, in order. He hoped, too, that the Company would long pursue the policy of making a good article at a cheap rate.

The proceedings then terminated.

LEWES GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on Monday, the 10th inst.—Mr. E. MORRIS in the chair.

The SECRETARY (Mr. Hillman) read the Directors report, as follows:—

The Directors report that the transactions for the half year ending Dec. 31, 1878, have been satisfactory. The profits amount to £1400 12s. 6d., and the Directors recommend that a dividend at the rate of 5 per cent. for the past half year be declared and paid upon the capital of the Company, which will absorb £1344.

The purchase of the old timber yard has been completed, and the land will shortly be available. The Directors are advised to erect a new gasholder, and to make the necessary alterations for the erection of an additional number of retorts to meet the future requirements of the Company, and they have directed plans and specifications for the new gasholder to be prepared for their approval.

The CHAIRMAN, in moving the adoption of the report, remarked that he need say but little to the Shareholders in recommending it to their approval, as it was brief, simple, and of a generally satisfactory character. A humorous friend near him had, however, suggested that he should deliver a lecture on the electric light. He would not do that, but he would briefly refer to the subject, which had engrossed the attention of a large number of the holders of gas shares. First of all, he regretted that gas Shareholders had not exercised their common sense, but had rather been the victims of a "scare," which had put money into the pockets of some, while it had been a loss to others. He did not doubt that the electric light might, and would be of use in some places, but it must be where expense was no object. It had for some three months been tried on the Holborn Viaduct, with the result that notice had been given of its discontinuance, in consequence of its expense; and, so far as he could learn, it seemed that the cost of a single light would be £200 a year. If that was so, then certainly Lewes would not be inclined to adopt it, as a couple of electric lights would cost £400, or more than the whole of the gas lights now in use. There would be this advantage arising out of the proposed introduction of the electric light—that it would raise the question of the production and purity of gas, and bring to bear on these works a greater scientific research, and this he believed would be followed by improvements which would increase the value of gas, by bringing it into common use, and causing its employment for purposes other than that of lighting, to which it was now mainly confined. He did not believe that the electric light would supersede gas, and he was of the opinion that gas shares would still remain a satisfactory property for investment. The report which had been read suggested that a dividend of 10 per cent. should be paid, and that was so far satisfactory; but the last clause of the report called for the serious consideration of the Directors. There was no doubt that, in declaring a dividend of 10 per cent., and delaying works which required to be done, they had sailed very close to the wind, and it was useless attempting to hide the fact from the Shareholders. Further works were necessary, and it would not be safe to continue as they had been going on. Additional manufacturing power and additional storeage were necessary, and a considerable outlay must be incurred in carrying out the necessary works. He hoped that the subject would be well considered, and that, eventually, the dividend of the Shareholders would not be lessened.

Mr. C. R. KEMP seconded the motion.

Mr. B. GODLEE gave his general support to the remarks of the Chairman, but felt that there were points in the report which were somewhat unsatisfactory. This being their first half-yearly meeting, they could not compare the report with any which had preceded it, but by taking the former yearly report, they could see that their position was favourable. In his opinion, it was unsatisfactory that, after extending their works so recently, it was now necessary to add to them again. He regretted that the Directors had sailed so close to the wind, and would rather have had a smaller dividend, with a greater certainty of the Company being in a safe position to meet all demands on their producing powers. He trusted that they would not run themselves so closely again, and that eventually they would get back to their 10 per cent. dividend. There was one point in their management on which he felt they might particularly congratulate themselves, and that was the large return they obtained from the residuals. It seemed that for coal, which cost them £1400, they had actually received no less a sum than £700 by the sale of coke, ashes, tar, and sulphate of ammonia. That return, it appeared to him, was exceedingly good, and was much better than he could discover in any other company. Referring to the electric light, he questioned the accuracy of the Chairman's figures, and argued that a single light would cost nearer £300 than £200 a year. For himself, he had so little confidence in it, that, after seeing it exhibited, and having a thousand pounds by him, he wrote directing the purchase of stock to that amount in The Gaslight and Coke Company, and by his speculation cleared £100.

Mr. LENNY said it had occurred to him that the amount of gas consumed was not quite so large as might have been expected from the quantity of coal used. A ton of coal should produce about 10,020 feet of gas, and, allowing 1000 for waste from leakages, about 8000 or 9000 feet of gas should be sold for every ton of coals. He had ascertained that the quantity of gas sold to coals consumed did not bear nearly so favourable a proportion as that. He thought that there must be some leakages, or that more gas was burned in the public lamps than the Directors were aware of. Again, there did not seem to him to be so much received from coke as there ought to be; but, on the whole, the balance-sheet was satisfactory.

Mr. WRIGHT (Assistant-Manager of the Brighton Gas Company) did not think there was much to complain of. In a town situated as Lewes was, a very small leak would amount to something considerable in the course of twelve months. To sell 9000 cubic feet of gas per ton of coal carbonized in any town would be exceedingly good work, and could hardly be expected in Lewes; indeed, it was only by very careful supervision of the distributing department that so high a result as 8500 cubic feet sold per ton could be obtained. Looking at the remarkable elasticity of their revenue, he did not think that the additional outlay on capital account would reduce the dividend. He expressed the satisfaction it gave him to see such large returns for residual products, remarking that scarcely any other company could show such a result. He quite concurred in the remarks the Chairman had made respecting the electric light. At the present time there did not appear to be much probability of it becoming a successful rival to gas lighting.

The motion was then put and carried.

Mr. J. L. PARSONS moved that a dividend of 5 per cent. for the past half year be paid to the Shareholders, pointing out that when this was done they would have a balance of £900 towards the proposed expenditure on a new gasholder and other works.

This motion having been seconded and carried, a vote of thanks to the Chairman terminated the proceedings.

BRISTOL GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Wednesday last—Mr. F. TEBBELL in the chair.

The SECRETARY (Mr. H. H. Townsend) read the notice convening the meeting, and the following report was taken as read:—

The audited accounts of the Company for the half year ended the 31st of Decembe last are herewith submitted to the proprietors. It will be seen that a more than usua increase has taken place in the gas-rental from private consumers, consequent on the increased demand for gas during the past half year. The very cold and dark weather during the past winter months contributed to this result, and the suddenness of the demand laid great strain upon both the producing and distributing powers of the works.

Following up the statement made to the Proprietors in the report presented to them at the last half-yearly meeting, the Directors have now the pleasure to state that the plans for the first section of the new station at Stapleton have been prepared, and contracts entered into for the execution of the work. The contractors undertake that the works shall be completed in time to be available for the supply of any demand for gas that may be made upon them during the winter of 1879–80. The excavations and buildings are proceeding with great vigour under the hands of the able and energetic contractors.

With regard to the various systems of lighting by electricity which have of late so much engaged the public attention, the Directors, after a careful investigation of the results of the experiments which have been made in many places, under circumstances the most favourable towards ensuring its success, are convinced that it has failed in the essential qualities of cost and general adaptation; and gas companies, therefore, need be under no apprehension that there is any prospect of its taking the place of gas in any cases except those of a very special kind, and where expense is not a matter of importance. The use of gas for heating, lighting, and as an economical motive power, is largely engaging the public attention, and its application in these directions will not fail to far outweigh any diminution in the consumption that may be caused by the use of the electric light.

To meet the cost of the new works, to which reference is herein made, the Directors will, under the power already given to them by the Proprietors, and in accordance with the provisions of the Act of Parliament, very shortly proceed to sell by auction additional capital stock of the Company.

The Directors recommend that a dividend at the rate of £10 per cent. per annum on the capital of the Company entitled to dividend be declared, and be made payable at the bank of Messrs. Miles, Cave, Baillie, and Co., Bristol, on and after Tuesday, the 25th day of March inst., subject to the deduction of income-tax.

The CHAIRMAN, in moving the adoption of the report and statement of accounts, hoped the Shareholders were as well satisfied with them as were the Directors. They would see that the demand for gas had been unusually great, in consequence of the long-continued dark and dreary winter they had had. The Directors had felt some anxiety as to the production of an adequate supply of gas at the different stations, but this contingency was not likely to arise again, because, in pursuance of the announcement made to the Proprietors at the last half-yearly meeting, they could now state that plans for the first section of the new works had been prepared, and contracts entered into for their execution. They were now, therefore, in a position to meet any demands made upon them in the winter of 1879–80. The works would be finished in time to meet those demands, and the Directors hoped that all neighbourhoods would then be properly supplied with gas. When they recollected that a few months since they were told in all quarters that gas was at an end, it was pleasant to know that their customers had increased in the number they had, whatever the cause of it might be, notwithstanding the very great bugbear that was made of the electric light. Speaking of the electric light, he could not help expressing his regret, and the regret of the Directors, that some persons—not so many in Bristol, perhaps, as in other places, but many among their own Shareholders—had suffered by the panic kept up so long and so cleverly, by people who, he might say, were interested in depressing the price of gas shares, in order, he was afraid—although he hardly liked to make such a charge—that when they were at a low price they might be bought

up and held until a higher one was reached. This was a system adopted in other things, and he had many reasons for believing that it had been done in the case of gas shares. The report also stated that the use of gas for heating, lighting, and as an economical motive power, was largely engaging public attention. To meet the cost of the new works, the Directors intended, under the power already given to them by the Proprietors, to sell by auction the additional capital stock of the Company.

Mr. MATIVIER seconded the motion.

Dr. HIGHETT observed that The Gaslight and Coke Company in London were paying 11 per cent., and they did that under an Act of Parliament which gave them power so to do. He had always understood that they could not pay more than 10 per cent. Could nothing be done by the Bristol Company to enable them to pay 11 per cent.?

The SECRETARY said the London Companies paid 11 per cent. under a Special Act of Parliament. They were on a sliding scale. A measure was introduced two sessions ago which provided that if the Companies had made a sufficient profit to pay a dividend of over 10 per cent., they could pay it on the condition that for every 1 per cent. they raised their dividend, the price of gas should be reduced 4d. per 1000 feet to the consumer. The Gaslight Company were in a position to reduce the price of gas within the terms of the statute, and they had enough money to pay the additional percentage, which they proceeded to do. Only two or three Metropolitan Companies had this power. The Bristol Company had no power to pay more than 10 per cent.

Mr. J. CHILCOTT drew attention to the fact that one of the London Gas Companies let out cooking apparatus on hire, to encourage the use of gas. He did not see why that could not be as well done as the hire of meters.

Mr. G. WILLS said that some time back he asked the Directors whether, in view of the possible introduction of the electric light, it would not be advisable to check the operations at Stapleton. Since then he had heard that the demand for gas was so great that it was impossible to stop them. He had no doubt the Directors were doing their best in the interests of the public and the Shareholders; but, when other companies were going to Parliament for power to supply the electric light, would it not be well that they should do so too? Had anything been done in that direction? Probably there were some difficulties in the way.

The CHAIRMAN thought the electric light was hardly worth applying for.

Mr. WILLS said the electric light must not be set aside as yet.

Mr. CHILCOTT thought they need have no fear of the electric light whilst they could supply gas at from 3s. to 3s. 6d. per 1000 feet. He hoped they would reduce the price of gas to 2s. if they could, and so compete with the electric light.

The SECRETARY thought there would be no competition at all with the electric light. Twenty-nine petitions from various companies, corporations, and private individuals had been presented to Parliament this session—two from companies who would manufacture the light exclusively, 18 from gas companies, and 9 from local authorities. The National Electric Light Corporation and another company had withdrawn their petitions; but a motion had been brought forward in the House of Commons on the previous evening, by the Chairman of Ways and Means, who recommended that a Select Committee should take two Bills as models, and determine what course legislation should take with respect to gas companies and municipal corporations applying for power to supply the electric light. These were the Bills of the Newcastle Gas Company and the Liverpool Corporation. Whatever was done with these would form the basis of a plan for dealing with all.

In answer to a question, it was stated by the ENGINEER (Mr. W. Fiddes) that the electric lighting on the Holborn Viaduct had been discontinued. The cost was four times as much as that of gas.

The CHAIRMAN said that gas, giving better illumination than the electric light, could be produced for the price the latter would cost.

The resolution for the adoption of the report was then carried.

The CHAIRMAN then moved the payment of a dividend at the rate of 10 per cent., subject to the deduction of income-tax.

Mr. COLTHURST seconded the motion, and observed that the Shareholders had not been so much scared in Bristol about the electric light as those in other towns had. Only about 70 shares had been transferred. The Directors had paid every attention to the electric light; and as to the London Companies paying 11 per cent., he reminded them that new gas companies had power to pay only 7½. They should put one against the other.

The motion was carried, and, on the proposition of Mr. G. WILLS, a vote of thanks was accorded the Chairman and Directors, and the proceedings terminated.

NEWCASTLE AND GATESHEAD WATER COMPANY.

The Thirty-fourth Annual Meeting of this Company was held on Thursday, Feb. 27—Alderman B. PLUMMER in the chair.

The SECRETARY (Mr. D. D. Main) read the notice of meeting, after which the following report was presented:—

The Directors beg to submit the usual annual accounts. The following is the comparison with last year:—

	Tenants.	*Receipts.*
Year ending Feb. 1, 1878	56,451	£52,263 6 6
Year ending Feb. 1, 1879	57,644	53,946 13 9

There has thus been an increase of £1743 7s. 3d. in the revenue, but as there was an actual decrease last year on the year preceding, the improvement continues to be small. This is accounted for by the general stagnation of trade, and the large number of unoccupied houses.

Owing to the intense and long-continued frost, the difficulty of maintaining the supply of water to the higher districts of Newcastle and Gateshead has been unprecedented in the experience of the Company, and has caused the Directors and Officials great anxiety, and has led to increased expense.

The practice here, as in other towns, of householders allowing their taps to run constantly day and night to prevent them freezing, caused such excessive waste, that, although one-third more water than usual was brought down from the store reservoirs, there was not sufficient pressure to maintain the supply to the higher districts; but by the employment of a large staff of men to visit houses and check the waste, and the temporary employment of additional engine power, the difficulty was overcome.

The works in connection with the large new reservoir at Swinburn were commenced in the spring, and made satisfactory progress until the frost set in, since which little has been done.

The following are the lengths and dimensions of the mains laid during the year:—

2-inch	442 yards.	8-inch	12 yards.
3 ,, ...	12,291 ,,	10 ,, ...	159 ,,
4 ,, ...	3,538 ,,	12 ,, ...	3,492 ,,
5 ,, ...	12 ,,		
6 ,, ...	117 ,,	Total . . .	21,473 yards.
7 ,, ...	1,410 ,,	or 12 miles and 353 yards.	

The working expenses during the past year having been larger than usual, and the interest account considerably increased, the Directors recommend that the dividend for the past half year should not be more than at the rate of 5 per cent. per annum, making, with that paid in August, 5½ per cent. for the year, and that the same be payable, with 5 per cent. on the preference shares, on the 8th of March.

The Directors retiring in the order of rotation are Mr. Wm. Dobson and Mr. Addison Potter, who are eligible for re-election.

Mr. Wall, who has for many years acted as one of the Auditors, also retires, and, the Directors regret to say, does not wish to be re-elected.

The CHAIRMAN said it was not a very agreeable thing to move the adoption of a report which was not quite so favourable as those of the previous two or three years; but it had arisen entirely from circumstances over which the Directors had no control. Although the report was not quite so favourable, nor their revenue so great, yet he believed the value of the property was increasing in a far greater proportion than the revenue was decreasing. The number of tenants had increased, though they were of a smaller class than usual. He might remark that four tenants alone, whose works were closed, had actually paid them about £2000 a year, and several others had paid in proportion. That all arose from the bad state of trade, and also the large number of unoccupied houses. They were told that two blacks did not make a white; still it was something to be able to say that in a great many other companies, among them some of the large companies, and even where works were in the hands of corporations, they had met with similar difficulties, especially, from inquiries which had been made, in places where the levels varied to the same extent as they did in Newcastle. In Liverpool, the normal supply of 97 million gallons per week had to be increased to 139½ millions, or 43 per cent.; in Manchester, the increase was 33 per cent.; in Birmingham, 30 per cent., and the water had to be supplied in water-carts to some of the outlying districts; in Glasgow, the consumption in the outlying districts was doubled; in York, the Company shut off the supply entirely during the night; in Sunderland, the consumption increased 2 million gallons per day; and in Wolverhampton, the supply was increased 50 per cent.; all owing to the practice of parties allowing their taps to run during frost. The system of constant supply day and night—made obligatory upon corporations and companies in the provinces, while London was exempt—operated hardly in such a long-continued period of frost; and, if such severe winters were more frequent, the obligation would become intolerable. Many of the difficulties with which their customers had had to contend had arisen entirely from the extraordinarily severe frost, over which they had no control at all. He had met a gentleman from Sheffield a fortnight ago, who told him that there had been hundreds of people without water in that place, but they had never for one moment blamed the Water Company, nor had he ever heard a single complaint, or seen a single article in the newspapers that the Company were to blame. To use a very strong expression, he said they might as well think of blaming the Water Company for the meat being frozen in the pantry, as blame them for the water being frozen in the pipes. But in Newcastle and Gateshead, somehow or other, they complained bitterly of the Company, and said it was their fault. They had not had much sympathy from the officials of the two boroughs, but they sincerely hoped that they should have the sympathy of the Shareholders. As they were aware, the Company were considerably increasing their capital. They were greatly extending their works, and, of course, for some time they would not obtain any return for that expenditure, and the increased amount of interest which they had to pay for it would necessarily still affect their dividend. He believed that in the course of three or four years their works would be complete, and second to none in the kingdom; but, in the meantime, they might suffer a little. The works at Swinburn had been unexpectedly delayed from two or three causes. The contract had been taken, but, through some litigation with the landowner, they were some time before they could put him in possession. Then the contractor had some difficulty in getting his plant removed from two or three other contracts by different lines of railway; but, after he had it fixed, he went on very rapidly, and very much to the satisfaction of the Company, until the unfortunate storm stopped his operations. Everything was standing still, but they hoped that it would not be for very long, and that the works would be completed, excepting the time that had been lost, in as short a period as had originally been expected. This outlay on the reservoirs to which they had consented would double their present storeage. He was glad to tell them that, at the present moment, their reservoirs were full, and they had been so for some time. That had been of great advantage to them during the difficulties with which they had had to contend. During the whole of the time that so many hundreds—he might almost say thousands—had been without a supply of water, they had been supplying the town at the rate of 12½ million gallons a day, whereas the ordinary average consumption was 9 million gallons. He was sorry to say that they were still sending into the town upwards of a million gallons per day more than the town required. They were quite certain that this was necessitated by burst pipes, and from parties leaving their taps running. The men who had gone round had discovered 2600 taps open, and 300 burst pipes. They believed the frost was not out of the ground yet, and that a great many burst pipes had still to be discovered. But they hoped that in a very short time they would get the consumption down to 9 million gallons a day. Fortunately, as he had said before, their reservoirs happened to be very full. With regard to the property they had purchased for their extended reservoirs, it was not quite settled. He was not prepared to tell them what they would have to pay for it; but he had every reason to believe that it would be quite as low as the original estimate. He moved that the report of the Directors be approved and adopted.

Alderman POTTER seconded the motion, and said during the whole time he had been a Director of the Company he might safely state that his co-Directors had never known such an anxious time as during the last three months. They felt that many people in the town were not having a supply of water, and yet they were doing all they possibly could to give them a supply. The circumstances had been entirely beyond the control of the Directors. They were so unaccustomed to such severe winters, that the arrangements for supplying each house were made as if they did not require to guard from frost at all. Had they been accustomed to such winters as the last, the pipes would have been so placed that there would have been no danger of their freezing. The Directors had done everything they possibly could, and they felt exceedingly the position in which the Company had been placed; or, rather, they felt the abuse which they had been getting from the outside people, both Shareholders and non-Shareholders. They could only assure them that they had done all they possibly could, and they hoped that such means would be adopted that, even in another unforeseen winter like the last, there would be no chance of hearing such complaints again.

Mr. W. GRACE said he was sure it must be very satisfactory to the Shareholders, and also, perhaps, to the general public, to know that the Company had an ample supply of water. But the late frost had certainly interfered with the distribution of the water, and he thought that generally the supply-pipes in houses were not sufficiently protected. The consequence was that they had been frozen and broken. He thought the Company in future should, where possible, stipulate that the pipes should be laid in a way that the frost would have more difficulty in getting at them. They were laid too near the surface at the present time, and that was the general complaint, for many persons had been without a supply of water through the pipes having been frozen. With regard to the accounts, the Chairman had said they were liable to a much greater outlay in the next three or four years. At the present time their capital account stood at £823,000; it had been increasing for years past. This last year it had increased £33,000, and the year before £50,000 or £51,000—or £84,000 within the last two years. The income had not increased in the proportion to cover the interest on that outlay, and he supposed in future years, when it was all expended, they would have to be content with even less dividend than they were receiving at the present time. It would be satisfactory to the Shareholders, he thought, to know the extent of the further outlay that

would be required before the new works were completed. One other matter. During the last three years there had been expended for trade purposes the sum of £25,000. Whether the new engine at Wylam was included in that he did not know, but he had always questioned the propriety of erecting that engine, and the propriety of making preparations for a separate supply. The Directors had taken it upon themselves, he supposed by the advice of some one; but he thought there was a very great want of an engineer upon whose authority and advice they could have those things extended. By relying on their own advice, and a little amateur engineering, they had literally expended £100,000 more than they should have done. He believed that £100,000 had been laid out on those fancy works, which never should have been expended. They had been driven to it, it was true, but he thought the means taken now ought to have been adopted years ago. There was where the great fault had been. If that had been done, they would never have required pumping-engines for an extra supply for trade purposes. It was a great reflection on the Company that such a large waste of money should have occurred. He thought it was a great deal owing to this unnecessary expenditure that they were placed in their present position. Perhaps the Chairman would tell them how much extra capital would have to be expended before the new works were completed.

The CHAIRMAN said he could not understand Mr. Grace saying that the Directors had taken upon themselves the providing of a separate supply, for it had been approved by the Shareholders, and it certainly would never have been entered into at all without their consent. They were finding, however, that it was of very great advantage indeed. Then, as to amateur engineering, and their not consulting a proper engineer, Mr. Grace must know that they had as their Engineer Mr. F. J. Bateman, who was certainly considered as one of the first, if not the very first engineer in the kingdom. Mr. Grace wanted to know what amount they were going to spend in future in addition, to what they were now spending. There were not any very large sums, excepting what the Shareholders had already consented to. The contract for the Swinburn works was let for something like £40,000. Two of the landowners had been treated with previously, and the property had been bought. With one of the owners they had a great deal of litigation, which was not quite concluded. But he could not exactly tell what the cost might be, though he should think the purchase of the land would about double the contract, or thereabouts. If he could give him the information he should be very glad to do so.

Mr. H. WATSON said there was no question that the works of the Company had been put to very severe trial during the late inclement winter. With some of the remarks of Mr. Grace he agreed. He thought they were bound to supply the public with water. The Company guaranteed a constant service, and he thought, if possible, they should not shelter themselves by an excuse. They ought to protect themselves from excessive winters, and their Engineer should be a gentleman of sufficient knowledge to see that they were protected. It had been said that some of their reservoirs were not water-tight. If so, there must have been a mistake somewhere in their construction. He fancied there was a considerable leakage or waste of water which did not appear to be accounted for. With reference to Mr. Grace's remark as to amateur engineering, he thought perhaps that had reference to their late esteemed Chairman (Mr. Sanderson), who paid great attention to the works, and, he was afraid, possibly he had taken upon himself, or might have done work which belonged to an engineer. In the olden time, they had Mr. Robert Middleton, who had the responsibility and charge of the works. Mr. Bateman was now looked upon as the Engineer-in-Chief, but he was at such a great distance from them that he could not be continually referred to on matters. He thought they ought really to have a local engineer, who would be responsible. Mr. Main was their Secretary, and had done them very great service; but he was not an engineer, and could not be made responsible for the shortcomings of the Company.

The CHAIRMAN said the reason that the extra supply of water had not been available for the high service was, that it had been drawn off by the low service through the taps being left open all night, and from other causes. He had never heard that their reservoirs were not water-tight, excepting that at Fenham, which only leaked after the water reached a height of 15 feet. Mr. Watson was quite wrong in saying that there had been amateur engineering, for they had entered on no great work of any kind without Mr. Bateman's approval; and he had no hesitation at all in saying that, with regard to a local engineer, he did not think that Mr. Watson would nominate the superior of Mr. Forster, whom they seemed to ignore altogether, as if they had no local engineer at all. This was not correct, and certainly not fair. The only new thing was that they were contemplating what would, to a certain extent, assist them in an extreme frost—namely, an additional pipe from Throckley to the town. It was rather hard on the Shareholders to be called upon to lay out several thousands of pounds for a thing of that sort, when they already supplied more water than was required, but for those extraordinarily special circumstances. It so happened that they could not bring the contemplated scheme before the Shareholders that day, as they had not obtained an Act of Parliament for it. It would depend whether they could treat with the different landowners to allow them to carry out the scheme; but so long as they supplied 3 million gallons a day more water than the town required under ordinary circumstances, it seemed rather hard to have to incur the expenditure. At all events, they were contemplating the scheme; and as soon as their plans were completed, the levels taken, and the direction of the pipe fixed, they should treat with the landowners to see if they would voluntarily, and on reasonable terms, allow them to execute the work. If not, they could not move in it until they obtained an Act of Parliament.

Mr. GRACE wished it to be understood that he had cast no reflection on the Directors individually, for individually they were above suspicion. As regarded the Engineer, he believed they had in Mr. Forster a very excellent servant, but they wanted a man between Mr. Bateman and Mr. Forster.

The SECRETARY said the question had been asked with reference to where the pipes had been frozen. He might say in almost all the cases—certainly in nine cases out of ten—the stoppage had been inside the houses, or in the yards. They had scarcely had a case where the pipe had burst outside. With reference to the general question of the short supply in the high districts, he thought that was a point which ought to be made very clear. They had two engines which supplied the high service. When the frost came on, so great was the draught of water on the lower level, that it would not rise to the engine to be pumped into the Fenham reservoir. That had been the cause of the whole difficulty. The engine was the best they had for the high service, and it had to remain idle because the water could not be made to reach it. The Directors, seeing this, and that it could not be remedied—although one-third more water was being sent into the town—proceeded at once to erect an additional engine. He never saw an engine put up in so short a time—about a fortnight—and after that was done, the water was pumped into the Fenham reservoir, and the difficulty was overcome. As to turning off the valves, it would have been a very dangerous proceeding in the intense frost. If they had shut the water into one district, it would probably have been frozen next morning. Besides, they were bound to maintain a constant supply, and if they turned off one district to give the water to another, they would run a very great risk in the case of fire.

The report was then adopted.

On the motion of the CHAIRMAN, the retiring Directors were re-elected.

The CHAIRMAN next moved a dividend at the rate of 5 per cent. per annum for the past half year on the ordinary stock, making, with that paid in August, 5½ per cent. for the year.

The motion was seconded and carried, and the meeting was brought to a close witha vote of thanks to the Chairman.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

In the coal trade generally there is but a very dull demand for all descriptions of fuel. Round coals for house-fire purposes only move off slowly, the winter demand for these being now at an end, whilst for gas-making purposes there is not yet much inquiry, the only business doing in this direction being a few small purchases which are required to enable consumers to carry them through until the fresh contracts are placed. One or two gas companies are already advertising for contracts, but it is not probable that any definite quotations will be sent out for another month or so. Judging, however, from the present indications of trade, there is every prospect, as I have intimated in previous reports, that consumers will be able to cover themselves at very low prices, common Arley, for gas-making purposes, being now offered at as low as 6s. 6d. per ton at the pit month. The other branches of the coal trade continue in a very depressed condition, owing to the stagnation in all the chief local branches of industry. Common round coal, for iron-making and steam purposes, is very bad to sell, and engine classes of fuel, although less slack is now being screened, continue abundant in the market, and very low in price. The average quotations at the pit mouth may be given about as under:—Best Wigan Arley, for house purposes, 9s. to 9s. 6d. per ton, with common qualities ranging from 7s. to 8s., and Pemberton four-feet, at from 7s. to 7s. 6d. per ton. Common round coal is very variable in price, inferior sorts being obtainable for sales in bulk at as low as 4s. 6d. per ton, whilst the better qualities range from 5s. 6d. to 6s. per ton. For good burgy, 4s. to 4s. 6d., and for good slack, 3s. to 3s. 6d. per ton is asked; but common burgy can be bought readily at less than 4s., and common slack at as low as 2s. per ton at the pit mouth.

As heavy stocks are held at many of the collieries, short time is now being commenced at some of the pits, and it seems likely that in the majority of cases not more than three to four days a week will be worked during the summer.

The coke trade is still extremely dull, owing to the small demand for this class of fuel for iron-making purposes, and any business offering in the market is keenly competed for by north country makers.

Lancashire makers of pig iron have profited to some little extent by the recent advance in the price of north country iron, but Middlesbrough makers are not able to obtain in this district the higher prices they are now asking, as other outside brands coming into the Lancashire market are offered at quite as low prices as ever. The finished iron trade is without any improvement whatever, and buyers with orders in hand can place them at very low figures.

Works all through the district are very short of orders, and reductions in wages continue to be carried out, the ironfounders in the neighbourhood of Bury having now reduced the wages of their moulders from 34s. to 32s. per week. The boiler makers strike against a reduction of 4s. per week, which has been carried on for three months, is now practically at an end, the Union being unable to give any further support to the men.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The gas coal trade of the North of England has been about a seasonable average over the past fortnight. The best gas collieries have wrought well; medium, moderate; inferior, badly. Best gas coals are very little over 6s. 6d. per ton net; medium, about 6s.; inferior, from 1½d. to 3d. per ton less. Shipments of gas coals are taking place for the Baltic, which will relieve the market somewhat. The shipments at the Tyne Dock were kept behind in the middle of the week, through stormy weather; but there being plenty of waggons on the standage, there were active exports upon the three last days of the week.

Coasting freights were extremely low last week. Two sailing vessels were chartered to load gas coal for Dover at 5s.; another for Exmouth, 8s.; London, 5s. 3d.; to discharge at the Wharf, Portsmouth, 5s. 9d.; Wyvanho, 5s. 10½d.; Portsmouth, 5s. 9d.; Copenhagen, 6s. 10d.; Fairwater, steam, 4s. 6d.; Swinemunde, 4s. 10½d.; and Cronstadt, 6s. 9d. Steamers are paid 5s. per ton to load gas coals for Hamburg, and 4s. London. These are almost unprecedentedly low rates for the season.

The Middlesbrough iron trade showed another slight improvement last week. Lead has advanced from 15s. to £1 per ton, from the lowest quotation. Red lead has risen £2 per ton within the fortnight. All descriptions of chemicals show an advance. The market is steady, and prices are very well maintained. There were good orders from America last week.

Workmen are getting more into employment in the North of England. There is still a lack of tone in business. Shipping remains in a very depressed state. The value of gas shares is very well maintained in the North of England. The dividends which have been declared within the fortnight are about the average. Nearly all the differences between the Companies and the Local Authorities with regard to extended parliamentary powers have been arranged, and there is not likely to be much waste of money in fighting out points in dispute before Parliamentary Committees. The experience of the past twelve months has in no sense affected the value of gas shares in the North of England. They still occupy a position amongst the best securities in the district.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The Paisley Town Council, sitting as Gas Commissioners, met last Tuesday, when several reports were submitted. One of them stated that fully 19 million feet of gas had been produced last month, and that the cost of coal carbonized was 15s. 10d. per ton. Since May of last year, upwards of 98 million feet had been manufactured, which showed a decrease of 1,328,000 feet as compared with the corresponding week of the previous year.

The village of Elderslie, which lies about midway between Paisley and Johnstone, and which was the birthplace of Sir William Wallace, the great Scottish patriot, and Knight of Elderslie, has just had its streets publicly lighted with gas for the first time.

At the last meeting of the Dundee Gas Commissioners, Mr. M'Crae, Manager of the Gas-Works, submitted an interesting and very valuable report upon the recent trials of the electric light in Dundee. His estimates of the expense of electric lighting, together with his statements of the difficulties, accidents, and variations in the results of the experiments, confirm the impression now generally prevailing that gas will not be suddenly displaced, either from dwelling-houses or the public streets, although in

some localities electricity may be used if the ratepayers are willing to pay the increased expense. The recent experiments and the exhibition of gas apparatus—for which the Dundee Gas Commissioners and their Manager are entitled to much credit—have shown how easily the lighting of the public streets may be greatly improved, and how important it is to attend to the gas-fittings, and especially the burners, in order to secure economy in domestic consumption. By adopting the most recent inventions in heating and cooking stoves, as well as in gas-engines, the use of gas is likely to be much more increased than it will be diminished by the adoption of the electric light. On Monday evening, the 10th inst., Mr. M'Crae had a very successful public exhibition of the capabilities of Wigham's small gas-burner, as designed for lighthouses.

Business was done in the Glasgow Corporation 9 per cent. annuities on the Edinburgh Stock Exchange, both on Thursday and Friday last—at £208¼ on Thursday, 10s. down, and at a decline of other 10s. on Friday. Edinburgh water annuities were also disposed on Friday at £146. On Friday week eight shares of the Montrose Gaslight Company were exposed for sale by public auction. Two were sold at £49 15s., and two at £50, and the sale of the remainder was then adjourned.

The Rothesay Town Council have now decided to proceed with the Loch Dhu water scheme for the supply of the houses occupying the higher levels in and around the town; and they have resolved to provide for the expense by borrowing, under the powers of the Public Health Act, the sum of £10,000, to be repaid in 30 years, by an annual payment of £5 19s. per cent.

On the 25th ult. the supply of water in the reservoirs of the Edinburgh and District Water Trust amounted to 2,261,484,413 gallons, as against 666,907,349 gallons on the corresponding day of last year.

A special meeting of the Dunfermline Town Council was held on Monday, the 3rd inst., when it was resolved to borrow the sum of £35,000, being the second instalment of the loan of £70,000, for the purposes of the Dunfermline Water Act. The money, which is to be obtained on the security of the rates and taxes, is repayable in 30 years, and bears interest at the rate of 1¼ per cent. per annum. While speaking of the Dunfermline water supply undertaking, I may mention that the week before last there was a great inundation in the Devon Valley, which caused very serious damage to the water-works at Glensherup, which are quite in the heart of the Ochil Hills, about eight or nine miles from Dollar, and some sixteen or seventeen miles from Dunfermline. The damage done is chiefly to the storeage reservoir, but the accident will not interfere with the supply of water to Dunfermline.

By eight votes against six, the Annan Police Commissioners have resolved to delay the execution of the proposed water and drainage schemes, and to request the Board of Supervision, in terms of the 9th clause of the Public Health (Scotland) Act, to send down a commissioner to inquire into the sanitary condition of the burgh.

The riparian proprietors on the Tweed, below the junction of the Gala, have, through their law agents, given intimation to the Galashiels manufacturers that unless steps are taken to stop the pollution of the Gala, an interdict will be asked for within two months. The Manufacturers Corporation held a meeting a few days ago upon the subject, to consider what should be done in the circumstances, when it was resolved to communicate, in the first place, with the Local Authority (the Town Council) before doing anything further.

On Monday, Tuesday, and Wednesday of last week Sheriff Birnie, Hamilton, held a public inquiry, ordered by the Home Secretary, in connection with the application of the parish of Bothwell for a Provisional Order to obtain a water supply from the Logan, Lesmahagow. A considerable number of witnesses were examined, including two medical gentlemen, who testified regarding the scarcity and bad quality of the water at present supplied to the district. Mr. Alexander Leslie, C.E., Edinburgh, explained the scheme proposed for meeting the circumstances of the case, and said that it could either be made to supply 400,000 gallons per day or 800,000 gallons per day. The first named quantity he thought would be ample for the district, as it would give about 33 gallons per head of the population taken at 12,000. In the one case, the cost was estimated at £34,500, and in the other at £41,000.

A special meeting of the Glasgow Corporation Water Commissioners is about to be held, to consider an important and interesting report by their Engineer, Mr. J. M. Gale, on the means of effecting a saving in the consumption of water. The report deals with the experiments which have been going on for the last few years in placing various districts of the area of supply under inspection, and the practicability of applying the same system over the whole area. Mr. Gale's conclusions are, that a moderate expenditure in capital would allow of the extension of the system, and that the results would amply justify the expenditure. Taking an area comprising a population of 80,000, regular inspection has had the effect of saving a third of the former supply, without in any way curtailing the needs of the inhabitants. On an average, the saving is 17 gallons per head per day. It would be too much to expect that the same high result would follow the extension of the system over the whole of Glasgow and the suburbs; but Mr. Gale certainly gives a cautious opinion in estimating that there would be a saving of 7 to 9 gallons per head over a population of 780,000. If the extension were spread over ten years, the extra expenditure would average £5000 per annum for that period; but there is every reason to expect that this would be recouped by the increased revenue of the Trust. Mr. Gale gives alternative schemes; but this, of spreading the work over ten years, has met the approval of the Sub-Committee, and is the one definitely recommended to the Commissioners for adoption.

The Glasgow pig iron market has been very firm during the past week, with a large business done. There is still a steady demand for investment. Business was done on Friday afternoon at 44s. 6d., and 44s. 9d. one month.

If anything, there is even a greater degree of dulness in the coal market, although the present cold weather may stimulate the demand. Some reductions of miners wages are announced—certainly not a sign of better trade.

BLAKENEY GAS COMPANY.—The annual meeting of this Company was held on Thursday, Feb. 27, under the presidency of Mr. White. The dividend declared was 6 per cent., and it was resolved to lower the charge for gas to 6s. 8d. per 1000 feet.

SALE OF GAS SHARES AT UXBRIDGE.—We observe that about 250 shares in the Uxbridge Gas Company will be sold by auction on Thursday, the 27th inst., by Messrs. Heron and Sons. The recent *exposé* of the great expense and failure of the electric light will doubtless cause these shares to be much sought after; indeed, shares in all good gas companies must again rapidly increase in value.

THE SALFORD BOROUGH COUNCIL AND THE ELECTRIC LIGHT.—At the meeting of the Council on the 5th inst., it was resolved that on the next application to Parliament by the Corporation of Salford, the Council be recommended to instruct the Town Clerk to apply for powers to light by electricity within the area of the gas supply, and to fix magneto-electric motors, and for such other powers as may be necessary in connection therewith.

BURSTING OF AN AMMONIACAL LIQUOR TANK AT STOURBRIDGE.—An iron tank at the Stourbridge Gas Company's works, Amblecote, constructed to hold 12,000 gallons of ammoniacal liquor, burst last Tuesday. While the tank was being examined for a leakage, the sides suddenly gave way, the contents rushing out in a torrent, injuring two men and damaging property. The tank was erected last autumn.

OPENING OF NEW WATER-WORKS AT LEAMINGTON.—The new water-works at Leamington, that have been constructed at a cost of upwards of £25,000, were opened last Tuesday. The water is lifted from a deep boring in the red sandstone, by two engines of 65-horse power each, into reservoirs on the Newbold Hills. Hitherto the town has derived its supply from the River Leam.

HORSHAM GAS COMPANY.—A meeting of this Company was held on Tuesday, the 11th inst.—Mr. Thorpe in the chair. The balance-sheet was examined and passed, and it was found that it allowed of the payment of a dividend of 5 per cent. for the past six months. The retiring Directors and Auditors were re-elected. It was reported that the price of gas had been reduced from 5s. to 4s. 7d. per 1000 feet, through the excellent management of the Directors, who were presented with £100 as a mark of the Company's satisfaction. The meeting closed with the customary vote of thanks to the Chairman, Directors, and officials of the Company.

BOGNOR GAS COMPANY.—The annual general meeting of this Company was held on Tuesday, the 4th inst., when the report and balance-sheet presented by the Directors were unanimously adopted. A dividend at the rate of 3 per cent. for the last six months was declared, which, with the previous half year's dividend of 4 per cent., makes a total of 7 per cent. for the past year. The Rev. Dr. Conder, Chairman of the Company, said the works were in good order, and he was pleased to say that the Directors had been able to reduce the price of gas by 5d. per 1000 feet. Messrs. Deacon, F. Fox, and Lovett were re-elected Directors, and a vote of thanks to the Chairman was passed.

TUNBRIDGE WELLS GAS COMPANY.—The fifteenth annual meeting of this Company was held on Wednesday, the 26th ult.—Mr. E. M. Hunter presiding. The Directors presented a report, which, together with the statement of accounts, was deemed highly satisfactory by the Shareholders. Dividends were declared at the rate of 10 per cent. per annum on the ordinary stock, and at the rate of 7½ per cent. per annum on the B debenture stock. Messrs. E. M. Hunter, W. Delves, J. Barnett, and W. Noakes, the retiring Directors, were unanimously re-elected, and Dr. Milner Barry was elected a Director in the room of Mr. Thomas Beeching, deceased. In the course of the proceedings great satisfaction was expressed at the position of the Company.

HOWDEN GAS COMPANY.—The annual meeting of this Company was held on Monday, the 3rd inst.—Mr. H. Tireman in the chair. The report of the Directors recommended the payment of a dividend of 14s. per share (being at the rate of 10 per cent.), a reduction in the price of gas from 6s. 8d. to 5s. 10d. per 1000 cubic feet, and the payment of a sum of £100 of the loans owing by the Company. A considerable balance remains to the credit of the Company after these payments have been made. The report and accounts were unanimously adopted. The retiring Directors, Mr. C. Hutchinson and Mr. W. E. Miller, were re-elected, and Mr. T. Hill was elected a Director in the place of Mr. J. Wood, jun., resigned. Mr. T. Fitch was re-elected Auditor, and the sum of £12 12s. was voted to the Directors for their services during the year.

THE PROPOSED PURCHASE OF THE DERBY WATER-WORKS.—A meeting of the Derby Water-Works Company was held last Thursday—Mr. Gascoyne in the chair—to take into consideration the proposal of the Corporation to purchase the works. The Secretary (Mr. Walker) read the heads of the proposed agreement between the Corporation and the Company, which have already appeared in the JOURNAL (*ante*, p. 280); and a statement was submitted as to the mode in which it was proposed to apply the purchase-money. The Chairman proposed that the seal of the Company should be affixed to the terms of the agreement, and also that the Company approve of the application of the purchase-money in the manner proposed. The Deputy-Chairman (Mr. Huish) seconded the proposition, and it was carried unanimously.

WATTON GAS COMPANY.—The annual meeting of this Company was held at the Hall, on Tuesday, the 4th inst.—Mr. J. E. Alexander in the chair. The statement of the accounts showed that the receipts for the year amounted, with a balance in hand of £202 1s. 6d., to £711 11s. 2d., and the expenditure to £535 9s. 3d., leaving a balance of £176 1s. 11d. available for dividends, &c. After some discussion as to the desirability of reducing the price of gas, it was ultimately resolved that it be reduced from 7s. 6d. to 6s. 8d. per 1000 feet. Mr. Robinson and Mr. Minns, two of the retiring Directors, were re-elected; and in the place of Mr. T. Barton and Mr. Perkins, who had retired, Mr. R. Martin and Mr. W. Clubb were appointed. It was agreed that a dividend of 5 per cent. be paid. Mr. J. W. Gowing, the retiring Auditor, was re-appointed, and a vote of thanks to the Chairman concluded the business.

BARNSTAPLE WATER COMPANY.—The half-yearly meeting of this Company was held on Monday, Feb. 24—Mr. H. K. Thorne in the chair. The Secretary (Mr. Heard) read the Directors report, which stated that the accounts showed a balance of £523 7s. 10d. in the hands of the Treasurer, from which the Directors recommended that a dividend at the rate of 8s. per share be declared, amounting to £480, leaving £43 7s. 10d. to be carried over to the current half year. Three Directors—namely, Mr. T. Curtis, Mr. J. L. Gweek, and Mr. J. Harris—retired by rotation, and, being eligible, offered themselves for re-election. A vacancy also existed by the resignation of Mr. J. R. Chanter, and it would be necessary to elect a Shareholder to fill the vacancy. Mr. Turner, one of the Auditors, who retired by rotation, offered himself for re-election. On the motion of the Chairman, seconded by Mr. Richards, the report was received, and, after some little discussion, the dividend was agreed to. The retiring Directors were re-elected; Mr. E. Dennis was elected in place of Mr. J. R. Chanter, resigned; and the Auditor was re-appointed.

BISHOP AUCKLAND DISTRICT GAS COMPANY.—The annual meeting of this Company was held on Friday, the 7th inst.—Mr. J. Jobson in the chair. The report was as follows:—"Your Directors have pleasure in submitting the balance-sheet and statement of accounts, examined and certified by the Company's Auditor, Mr. John Slator, of Durham, public accountant. The profit and loss account shows a balance (after deducting the interim dividend paid in August last) of £1239 19s. 6d., out of which your Directors recommend payment, on the 7th of March, of a dividend at the rate of 11 per cent. on the original, and 8 per cent. per annum on the new capital of the Company. Your Directors have decided to commence with the erection of the new works at once, and trust that some part of them may be ready for the storeage of gas before the 1st of November next. The retiring Directors are Mr. John Burdon and Mr. James Thompson, both of whom are eligible, and offer themselves for re-election." The balance-sheet for the year ending Dec. 31, 1878, showed that the amount paid up on the original shares was £13,960. There had also been issued 2000 additional shares, upon which £1865 had been paid, leaving £46,040 remaining to be issued. The revenue account showed an expenditure of £2720 14s. 10d., and the

receipts to be £4768 6s., leaving a balance of £2047 11s. 2d. to be carried to the profit and loss account. The amount of coal used during the year was 3102 tons 17 cwt.; and 56,690 bushels of coke had been made, of which 14,172 bushels had been used in manufacture, and 42,518 bushels sold.

NEATH WATER COMPANY.—The half-yearly meeting of this Company was held at Queen Anne's Gate, London, on Friday, Feb. 28—Mr. M'Dougall Smith in the chair. The Secretary read the report of the Directors, which stated that, in accordance with a resolution passed at a special meeting, held on Feb. 28, 1874, dividend warrants would be forwarded to the Shareholders of the Neath undertaking at the rate of 10 per cent. The Directors regretted that the accounts presented compared, in some respects, unfavourably with those of the previous half year; but it would at once be seen that the depression of trade in the district had more than counteracted the improved revenue expected. Amongst other causes which led to this were the payment of the large sum for rates, which had been paid under protest to the Local Authorities, and the fact that the Authorities of Skewen had not made the supply of water compulsory on the inhabitants of the district. The accounts showed a balance available for division amounting to £1025 12s. 8d. The Chairman moved the adoption of the report and accounts, and expressed a hope that as a very satisfactory advance had taken place in the price of tin, the improvement would soon spread to Neath, which was the centre of the tin-plate trade. Mr. W. Wakeford seconded the motion, which was carried; and the dividend recommended was declared. The meeting closed with a vote of thanks to the Chairman.

CHICHESTER WATER-WORKS COMPANY.—The eleventh half-yearly meeting of this Company was held on Thursday, the 27th ult.—Mr. W. Smith presiding. The report expressed the Directors sense of the great loss which the Company had sustained in the death of their late Secretary, Mr. F. J. Malim. The vacancy had been filled by the appointment of Mr. Edward Arnold. The receipts during the last three half years were respectively £444 1s. 6d., £435 12s. 5d., and £504 4s. 11d. There had thus been an advance of nearly 15 per cent. on the receipts of the corresponding half of the previous year; 25 additional services had been fitted, and the water had been laid on at the Cathedral, as a protection in case of fire. The net gain on the half year was £302 5s. 6d., and the Directors recommended a dividend of 2s. 6d. on each share (£10), which would amount to £184 10s., leaving a balance of £48 6s. 2½d. The report was agreed to, and the retiring Directors, Messrs. W. Duke and W. Norman, were re-elected. Mr. Alfred Dunn was re-elected Auditor, and Mr. T. B. Wilmshurst was appointed as Auditor in place of Mr. Gadd. From the revenue account of the Company for the half year ending Dec. 31 last, it appeared that £225 10s. 3d. had been received for water-rents for the Michaelmas quarter, and £234 17s. 5d. for water-rents to Christmas. The Contractor for street-watering had paid £45, and with the rent of meters, fees on share certificates, and transfers, &c., the receipts amounted to £526 5s. 4½d., out of which there had been an expenditure of £293 9s. 2d. By the capital account, it seems that 1476 £10 shares have been issued and fully paid up, and there remains to be issued £5240; the total amount authorized being £20,000. The Company have expended, in acquiring lands, easements, &c., £461 3s. 3d.; in purchase of pipes, laying mains, &c., £214 0s. 9d.; there is a balance due for new engine, £197 14s., which, with the expenditure up to June 30, 1878, amounting to £13,952 0s. 3½d., and a few small items, made the total expenditure of £14,871 0s. 3½d.; being £111 0s. 3½d. in excess of the receipts.

FOLKESTONE GAS COMPANY.—The half-yearly meeting of this Company was held on Monday, the 3rd inst., when the report, which was presented by the Directors, stated that of the £60,000 forming the paid-up capital of the Company, £55,422 0s. 11d. had been expended. The profits of the past half year amounted to £3929 16s. 7d., or £230 2s. in excess of the profit for the corresponding half of the previous year. The total amount standing to the credit of profit and loss account amounted to £5487 12s. 7d. From this sum the Directors recommended a dividend of 10 per cent. on the 4500 original shares, and 7 per cent. on the 1500 new shares created in 1876. This would absorb £2775, and leave an unappropriated balance of £2712 12s. 7d., of which £1154 16s. 7d. was the amount set apart from the past half year. The total amount of the reserve-fund has now reached £4712 12s. 7d., or only £1287 7s. 5d. less than the maximum reserve allowed by Parliament on the present capital of the Company. The report further stated that the consumption of gas throughout the town has increased in a ratio which is altogether without precedent in the annals of the Company, the quantity of gas supplied during the six months ending Dec. 31 last having exceeded by 3,833,600 cubic feet the quantity supplied during the corresponding period of 1877. The increase is expected to be continued on various grounds. The price of gas will, after the present quarter, be reduced from 4s. to 3s. 9d. per 1000 feet. Reference is made to the electric light, about which the report says, "It will be the duty of your Directors to watch the legislation of the present session of Parliament with reference to this light. Your Directors do not believe that Parliament will delegate a power to introduce the light as a general system of lighting into any locality, without putting the promoters under penalties for a failure to make the light continuous, to the same extent as gas companies are under, and your Directors do not believe that any body of men will be found to undertake such a responsibility." The concluding paragraph of the report referred to the loss the Company had sustained by the death of their late Chairman, Mr. Thomas Cobb, who served as a Director of the Company for upwards of 28 years. The vacancy in the chairmanship thus occasioned has been supplied by the election of Mr. Richard Hart. The report was approved and the usual votes of thanks passed to the officers.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

920.—HOLMES, B. G., Leytonstone, Essex, "Improvements in globes or shades for lamps." March 8, 1879.
925.—HEDGES, K. W., Westminster, "Improvements in electric lamps." March 8, 1879.
927.—THOMPSON, R. C., Herne Hill, Surrey, "Improvements in the means employed for producing the electric light." March 8, 1879.
931.—WOODWARD, J., Manchester, "Improvements in arrangements or apparatus for obtaining increased illuminating power in burning gas." March 10, 1879.
947.—HADDAN, H. J., Westminster, "Improvements in apparatus for electric lighting." A communication. March 11, 1879.
948.—PAGE, R. W., Hammersmith, and SPERRYN, J. N., Brixton, London, "Improvements in holders or galleries for supporting globes or shades for gas or other lights." March 11, 1879.
956.—HOLMAN, S., Queen Victoria Street, London, "Improvements in apparatus for the manufacture and distribution of gas." March 11, 1879.
958.—NEWTON, H. E., Chancery Lane, London, "Improvements in liquid-meters." A communication. March 11, 1879.
963.—CLARK, A. M., Chancery Lane, London, "Improvements in the construction of lamp 'suspensions,' brackets, chandeliers, and the like." A communication. March 11, 1879.
989.—COBT, J., Lower Bland Street, London, "Improvements in apparatus used in the manufacture of gas." March 13, 1879.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3639.—PARKINSON, G. J., Balsall Heath, Worcester, "Improvements in gas-burner regulators." Sept. 16, 1878.
3656.—STUART-WORTLEY, A. H. P., Grove End Road, London, "Improvements in the manufacture of electrodes for electric lighting, and in the manner of partially protecting the incandescent points from oxidizing or destructive action." Sept. 17, 1878.
3768.—LAKE, W. R., Southampton Buildings, London, "Improvements in apparatus for the manufacture of gas." A communication. Sept. 24, 1878.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

249.—VAUGHAN, E. P. H., "An improved fire-alarm and gas intercepter." Jan. 21, 1876.
268.—WEBB, C. B. S., "Improvements in taps and valves." Jan. 24, 1876.
273.—JOHNSON, J. H., "Improvements in apparatus for cleansing water from impurities." Jan. 24, 1876.
281.—BRINJES, J. F., "Improvements in apparatus for raising, forcing, and exhausting water or other liquids, also air and gases." Jan. 25, 1876.
508.—NEWTON, A. V., "Improvements in centrifugal pumps." Feb. 8, 1876.
842.—JENSEN, P., "Improvements in liquid and fluid meters." Feb. 29, 1876.
858.—STRONG, M. H., "Improvements in the manufacture of gas for illuminating and other purposes." Feb. 29, 1876.
869.—HALLSWORTH, S., and BAILES, R., "Improvements in purifying illuminating coal gas, and in the preparation of the means employed therefor." March 1, 1876.
968.—SMITH, W., "Improvements in dry gas-meters." March 6, 1876.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

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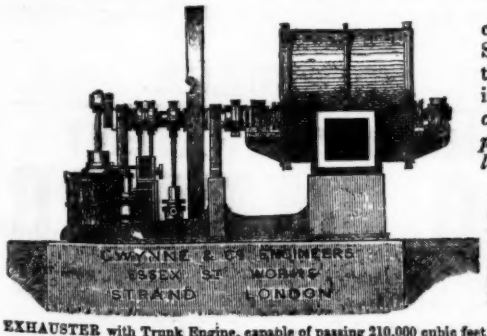
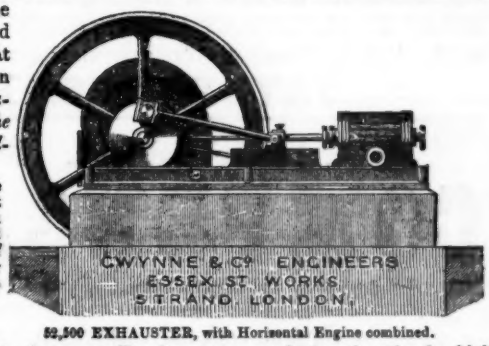


EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



82,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

WANTED, Readers of the NEW Edition, 1879, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, A.I.C.E., Gas-Works, SYDENHAM, S.E.

WANTED, a Young Man as Meter INSPECTOR, and to assist in Laying Mains, Services, &c.
State qualification and Wages, to C. HENSHAW, Clerk to the Commissioners, LEEK.

WANTED, by a thorough Practical Gas Manager of 20 years experience, the Management of medium-sized Works. Is well up in every department, also in Alterations and Extensions. Has first-class testimonials. Present Works paying 10 per cent.
Address No. 533, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Advertiser, a Re-engagement as MANAGER of a Gas-Works. Has had many years thorough practical experience in the actual Management of Gas-Works and Repairs. Can design and carry out any extension or alteration required. Good references.
Address No. 534, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SHREWSBURY GAS COMPANY.

WANTED immediately, a Manager and Secretary, thoroughly acquainted with the Engineering in connection with the Manufacture and Distribution of Gas, upon the most approved principles, also the general routine of office work. Salary, £300 per annum.
The person selected must give security in the sum of £500, and devote the whole of his time to the service of the Company.
Personal canvassing not allowed.
Applications, stating whether married or single, age, and experience, accompanied by testimonials of recent date, not exceeding four in number, to be forwarded to me, on or before the 3rd of April next, endorsed, "Application for Manager."
By order,
S. B. DARWIN, Secretary and Manager.
March 6, 1879.

WANTED, a good Fitter; one competent to do Main and Service Laying, Meter Fixing, Repairs and Inspection, Internal Fittings in Iron and Compo. Handy at Smith's work, and able to do the repairs on a works where an exhauster is in use. Testimonials as to abilities and sobriety indispensable.
Apply, enclosing recent testimonials, stating full particulars, in own handwriting, as to wages, &c., to HARRY WIMHURST, Manager, Gas-Works, Sleaford, LINCOLNSHIRE.

WANTED, by a Young Man (married), a Situation as MANAGER, or Secretary and Manager, of a small Gas-Works, or Assistant in a larger one. Has had considerable experience in the Manufacture and Distribution of Gas in all its branches; five years sole Manager. No objection to any place in the United Kingdom. Satisfactory reasons for change. Unexceptional references and testimonials.
Address, in first instance, No. 526, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BOROUGH OF SOUTHPORT.

WANTED, a Gas Manager. He will be required to devote the whole of his time to the duties of his office, and to reside at Crowlands Gas-Works. House, coals, gas-rates, and water free.
Applicants must state age, experience, and salary required. The annual make of gas is about 170 million cubic feet. Duties to commence 1st of May next. Personal canvassing not allowed.
Applications, endorsed "Gas Manager," must be forwarded to me on or before March 22, 1879.
By order,
KEIGHLEY WALTON, Town Clerk.

WANTED, by the Aitford Local Board of Health, a Practical GAS-FITTER. The person appointed must be thoroughly competent to Repair all Lanterns, Governors, Burners, Cocks, &c. He will also be required to undertake the Cleaning, and assist in Lighting and Extinguishing the Lamps. Salary 26s. per week.
Applications, personal or in writing, to be made to me not later than the 24th inst., accompanied by testimonials of recent date.
GEO. MATHER, Surveyor.

FOR SALE.—A 5-Horse Power Combined STEAM-ENGINE, with Vertical Boiler.
To be seen, and all particulars obtained, on application to GEORGE PERRY, Gas-Works, BISHOP STORTFORD.

STATION-METERS (Two Second-Hand) One passing 5000 ft. per hour, with Valves and Connections; the other passing 1500 ft. per hour, with 4-in. inlet and outlet. Both in good order, being removed to make room for larger ones.
For prices and particulars, apply to W. AND B. COWAN, LONDON, MANCHESTER, or EDINBURGH.

GAS SHARES IN THAT MOST PROSPEROUS CONCERN, THE UXBRIDGE GAS COMPANY.

ABOUT 250 Ten Pound Shares in the above Company, to be SOLD BY AUCTION, by Messrs. Heron and Sons, at the Chequers Hotel, Uxbridge, Middlesex, on Thursday, March 27, 1879, at Two for Three o'clock, in Lots of from Two to Ten Shares each.
The Shares are fully paid up, and are in receipt of the maximum dividend allowed by the Act of Parliament—viz., in the respective cases, 7, 7½, and 10 per cent. per annum, and will be sold with the accruing dividend from Christmas last.
This is an excellent opportunity for investing money safely at a really good rate of interest.
Particulars may be obtained of Messrs. HERON AND SONS, Auctioneers and Valuers, Uxbridge, MIDDLESEX.

TO IRONFOUNDERS.

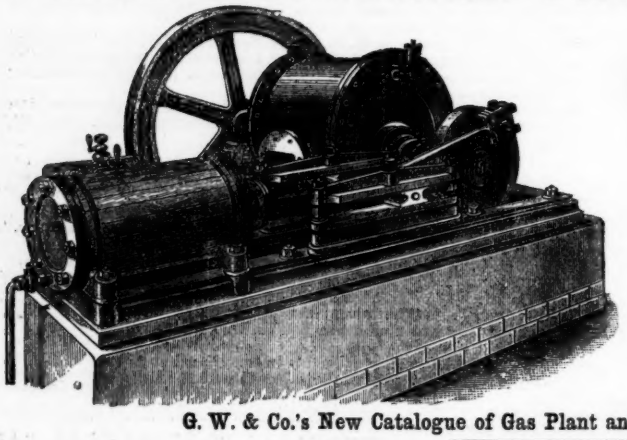
THE Directors of the Denbigh Gas Com-pany are prepared to receive TENDERS for the Construction of a GASHOLDER, 50 ft. diameter and 18 ft. deep.
Plans and specification may be seen on application to the Engineer, Mr. F. J. Collingwood, Rhyl.
Tenders, sealed and endorsed "Tender for Ironwork," may be delivered not later than the 29th of March, addressed to the Chairman of the Gas Company, under cover to the undersigned.
The Directors do not bind themselves to accept any tender.
W. V. JONES, Secretary.
Vale Street, Denbigh.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS

WITH

Wrought-Iron Spindles and

ENGINES COMBINED.



SOLE MAKERS,

GEORGE WALLER & CO.

MAKERS OF ENGINES, EXHAUSTERS,
INDEX AND DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, AND OTHER PUMPS,
SCRUBBERS AND PURIFIERS,
CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

Phœnix Engineering Works:
HOLLAND STREET, SOUTHWARK, S.E.

TO GAS ENGINEERS.

D. BRUCE PEEBLES & CO.

Beg to call the attention of Gas Engineers to the fact that the novel and original feature in connection with PEEBLES' SYSTEM OF CONTROLLING THE ACTION OF GAS GOVERNORS is the loading or acting on the Bell by Pneumatic Pressure instead of Weights.

TAY WORKS. BONNINGTON, EDINBURGH.

THE IMPERIAL METER COMPANY'S PATENT

COMPENSATING METER

Is adopted by the principal Gas Companies as being infinitely the simplest Compensating Meter, certain in action, and less liable to derangement from any cause than any other form of Meter.

THE ONLY METER SUITABLE FOR TROPICAL CLIMATES.

By its self-adjusting principle it maintains an unvarying water-line; and the Reservoir contains sufficient water to supply the Meter for ten or twelve months without attention. It is unaffected by "tilting," and cannot be "flooded" by any pressure.

The Gaslight and Coke Company, of London, proving this Meter to be so perfect and reliable under the test of use on a large scale, have, DURING TWO YEARS just past, had UPWARDS OF EIGHT HUNDRED Wet Meters, supplied by other parties, altered by The Imperial Meter Company, to their Patent Compensating principle.

WET AND DRY GAS-METER WORKS, **KING'S ROAD, ST. PANCRAS, LONDON, N.W.**

SOUTHWELL GAS COMPANY.

THE Directors are desirous of receiving TENDERS for the Purchase of the TAR and WATER made at these Works for One year.

For further particulars apply to J. KIRKLAND, Secretary.

Southwell, March 12, 1879.

THE Huyton and Roby Gas Company are prepared to receive TENDERS for the Supply and Erection of two PURIFIERS, 12 ft. by 8 ft. by 5 ft. deep.

Plans and specification can be seen at their Works at Huyton Quarry, near Liverpool.

Tenders to be sent in on or before the 31st of March.

FREDK. PRITCHARD, Engineer and Manager.

EXHIBITION OF GAS APPARATUS.

THE Gas Committee of the Leeds Corpo- ration have determined to hold an EXHIBITION of GAS-STOVES and other APPARATUS for the economic Use of Gas for Domestic and Manufacturing Purposes, in the Victoria Hall, Leeds, from the 21st of April to the 1st of May inclusive.

Applications for Space, forms of Conditions, &c., to be made to HENRY WOODALL, Gas Engineer.

GAS PLANT.

THE Corporation of Richmond (Yorks) have for disposal a quantity of Modern-made GAS PLANT, consisting of Hydraulic Main for 10 Retorts, with Ascension-Pipes, Mouthpieces, Bridge and Dip Pipes, Set of Condensing Pipes, two Washers, Set of four Purifiers. The above are in good order, having been recently replaced by larger plant.

For further information, apply to J. MEIKLEJOHN, Manager.

TO TAR DISTILLERS.

THE Directors of the Wakefield Gaslight Company are prepared to receive TENDERS for the Purchase of the Surplus TAR produced at their Works for the period of One year, from the 1st day of April next.

Approximate quantity, 800 Tons.

Sealed and endorsed Tenders to be sent in not later than the 22nd day of March inst.

By order,

JOHN W. WHITAKER, Manager and Secretary.

Gas Office, March 10, 1879.

BRISTOL UNITED GASLIGHT COMPANY.

TENDERS FOR CAST-IRON MAIN-PIPES.

THE Bristol United Gaslight Company are desirous of receiving TENDERS for the Supply of nearly 1000 Tons of Cast-Iron STREET-MAINS, of various sizes, and with Bored and Turned Joints.

A specification of the quantities and other particulars of each size, and of the conditions of the contract, may be seen at the office of the Engineer of the Company, at Canons Marsh, Bristol.

Sealed Tenders, marked "Tender for Pipes," addressed to the Chairman of the Company, must be delivered not later than the 25th inst., at the Office of the Company.

Neither the lowest nor any tender will necessarily be accepted.

By order of the Directors,

HENRY H. TOWNSEND, Secretary.

Offices, Canons Marsh, Bristol, March 14, 1879.

TO BOILER MAKERS AND OTHERS.

THE Directors of the Dover Gaslight Company invite TENDERS for the Supply of a Cornish BOILER, 5 ft. in diameter and 20 ft. long, the drawings and specifications of which can be seen, on and after Monday, the 17th of March inst., at my Office, or at the office of their Engineer, Mr. Thomas N. Kirkham, 21, Abingdon Street, Westminster.

The party whose tender may be accepted will be required to enter into an agreement to supply the boiler according to the terms of the specification.

The Directors do not bind themselves to accept the lowest or any tender.

No tender will be received unless it is made upon one of the Company's printed forms, marked "Tender for Boiler," and delivered at my office, 14, Snargate Street, Dover, on or before Eleven o'clock a.m., on Saturday, March 29, 1879.

G. FIELDING, Secretary.

CITY OF HEREFORD.

TO FIRE-BRICK AND RETORT MANUFACTURERS.

THE Gas Management Committee of the Hereford Corporation hereby invite TENDERS for the Supply and Delivery, at the site of the new Gas-Works, by the 1st of June next, 60 Circular RETORTS, 1 ft. 6 in. diameter and 10 ft. long, together with the necessary bricks, fire-clay, &c., for setting the same, particulars of which may be obtained from the undersigned.

Tenders, endorsed on the outside, and addressed, "Chairman, Gas Management Committee," are to be sent in on or before Monday, the 31st inst.

The said Committee do not bind themselves to accept the lowest or any tender.

By order,

WILLIAM DAVIS, Engineer.

Gas Office, March 7, 1879.

CITY OF HEREFORD.

CONTRACT FOR GAS COAL.

THE Gas Management Committee of the Hereford Corporation hereby invite TENDERS for the Supply of Best GAS COALS, required for One or Two years from the 1st of May next. The quantity will be 5000 to 5500 Tons per year.

The whole of the coal to be well screened, free from bats, dirt, or pyrites, and fit for gas-making purposes, to the satisfaction of the Manager of the Gas-Works.

Parties tendering, to quote price put into the Corporation's waggons at the pit.

Tenders, endorsed on the outside, and addressed "Chairman, Gas Management Committee," are to be delivered by Eleven a.m. on Tuesday, the 1st day of April next.

The said Committee do not bind themselves to accept the lowest or any tender.

By order,

WILLIAM DAVIS, Engineer.

March 11, 1879.

TO CONTRACTORS AND OTHERS—TENDERS FOR GASHOLDER-TANK.

THE Directors of the Dover Gaslight Company invite TENDERS for the Construction of a Brick and Puddle GASHOLDER-TANK at their Buckland Works, drawings and specification of which can be seen, and form of tender obtained, at my office, or at the office of their Engineer, Mr. T. N. Kirkham, 21, Abingdon Street, Westminster, any day after the 15th of March inst., between the hours of Ten and Four.

The party whose tender may be accepted will be required to enter into a contract with two sureties for the due performance of the works.

The Directors do not bind themselves to accept the lowest or any tender.

No tender will be received unless it is made upon one of the Company's printed forms, marked "Tender for Tank," and delivered at my office, 14, Snargate Street, Dover, on or before Eleven o'clock a.m., on Saturday, March 29, 1879.

G. FIELDING, Secretary.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

COAL CONTRACT.

THE Directors of the above Company are prepared to receive TENDERS for the Supply of about 20,000 Tons of best Newcastle GAS COAL, to be delivered alongside the Company's premises at Wandsworth.

Printed conditions of tender may be obtained on application to the Secretary of the Company, and tenders must be sent in, marked "Tender for Coals," on or before the 25th of March.

The Directors do not bind themselves to accept the lowest or any tender.

C. W. GRAY, Secretary.

North Street, Wandsworth, March 11, 1879.

TENDER FOR NEW RETORT-BENCH.

THE Town Commissioners for Bandon are desirous of receiving PLANS, SPECIFICATIONS, and TENDERS for a new BENCH OF RETORTS, to be erected complete, with new Hydraulic Main, Mouth-Pieces; Bridge, Dip, and Ascension Pipes; Furnace Doors, and all Fittings complete, and ready for making Gas.

The retort-house is 26 feet inside walls, and in that space they would require one setting of nine retorts, one setting of six retorts, and two settings of three retorts each, in all 21 retorts.

Tenders to include all materials and carriage, and to be lodged with me on or before Saturday, the 5th of April next.

The work to be subject to the approval of such person as the Town Commissioners may select.

S. R. TRESILIAN, Clerk to Town Commissioners.

MANCHESTER CORPORATION GAS-WORKS.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee will receive, not later than the 25th day of March next, TENDERS of GAS COAL of approved quality for delivery at their Works, situated at Gaythorn and Rochdale Road, over a period of One or more years, commencing from the 30th day of June next, and the Committee are now prepared to receive applications for permission to submit samples of the material proposed to be offered.

Sealed tenders, stating price and quantity proposed to be delivered at each works, and the rate and period of delivery, and endorsed "Tender of Gas Coal," must be addressed to the Chairman of the Gas Committee, and delivered at his office on or before Tuesday, the 25th day of March next.

The Committee do not bind themselves to accept the lowest or any tender.

By order,

JOSEPH HERON, Town Clerk.

Town Hall, Feb. 28, 1879.

TO IRONFOUNDERS.

THE Directors of the Radcliffe and Pil- kington Gas Company are prepared to receive TENDERS for the following Cast-Iron Spigot and Socket PIPES, with various Branches and Connections, delivered at Radcliffe station, on the Lancashire and Yorkshire Railway:—

200	yards,	8 inches	diameter, in	9-feet	lengths.
1200	,,	10	,,	9	,,
300	,,	12	,,	12	,,
550	,,	18	,,	12	,,

Specification, quantities, and form of tender, may be had on application to Mr. Thomas Newbiggin, C.E., No. 5, Norfolk Street, Manchester, and to the undersigned at the Gas Office.

Sealed tenders, endorsed "Tender for Main-Pipes," to be sent in, addressed to the Chairman of the Company, on or before Thursday, the 27th inst.

The Directors do not bind themselves to accept the lowest or any tender.

By order,

JOHN BRANDWOOD, Manager and Secretary.

Gas Offices, Radcliffe, March 12, 1879.

WINDSOR ROYAL GASLIGHT COMPANY.

THE Directors of this Company invite TENDERS for the Supply of 5000 Tons of GAS COALS (unscreened), to be delivered free at the Windsor Station of the Great Western Railway, such Coals to be of either of the following descriptions—viz., New Pelton, Pelaw Main, or Holmside.

The Contractor to state for which Coals he tenders, as none others than those specified will be received.

The Coals to be delivered as follows—viz., April and May, 300 tons each; June, July, and August, 400 tons each; September, 500 tons; October, November, and December, 600 tons each; January, February, and March, 1880, 500 tons each month.

A separate tender to be sent stating the price per ton for a Two years contract under the same conditions.

The tenders to be forwarded to me on or before March 31, 1879.

The Directors will not entertain any conditional tender, or be bound to accept the lowest or any tender.

By order,

GEORGE CARTLAND, Secretary.

Victoria Street, Windsor, March, 1879.

COMMERCIAL GAS COMPANY,

NOTICE is hereby given that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on FRIDAY, the 4th of April, 1879, at Twelve o'clock at noon, to receive the Report of the Directors, to declare a Dividend, to elect Directors and an Auditor in place of those retiring, and for other business.

The Books will be closed for the transfer of Stock from the 22nd of March inst. to the 4th of April, both days inclusive.

By order of the Board,

EDWARD J. SOUTHWELL, Secretary.

Offices, Stepney, March 7, 1879.

THE BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is hereby given that the HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at this Office, on WEDNESDAY, the 26th inst., at One o'clock precisely, to transact the usual business, and to declare the Dividend for the Half Year ending the 31st of December last.

Notice is hereby also given that the Transfer Books of the Company will be closed on the 14th, and re-opened on the 27th inst.

By order of the Court of Directors,

FREDERIC LANE LINGING, Secretary.

Chief Office, No. 11, George Yard, Lombard Street, London, E.C., March 5, 1879.

PHŒNIX GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the ADJOURNED HALF-YEARLY GENERAL MEETING of the PROPRIETORS holding, previous to the 31st of December last, £300 and upwards of paid-up capital, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 2nd of April, at Two o'clock precisely, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring Dividends to the 31st of December last, to elect Directors and Auditors for the ensuing year, and on other business.

The Transfer Books will be closed on and after the 12th of March, and reopened on the 3rd of April.

By order of the Court of Directors,

ISAAC ADOLPHUS CROOKENDEN, Secretary.

70, Bankside, London, S.E., March 5, 1879.

SOUTH METROPOLITAN GASLIGHT AND COKE COMPANY.

589, Old Kent Road, S.E.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at the Terminus Hotel, London Bridge Station, in the Borough of Southwark, on MONDAY, the 7th day of April next, at Two o'clock in the afternoon precisely, to receive the Directors Report and the Accounts of the Company for the half year ended the 31st of December last, to declare a Dividend, to elect a Director in the place of Julian Hill, Esq., and an Auditor in the place of A. Footner, Esq., who retire by rotation, but, being eligible, offer themselves for re-election; also a Director in the place of T. B. Simpson, Esq., who has resigned.

Any Proprietor, holding shares on which £3000 has been paid, intending to become a candidate for either of these offices, must give notice in writing at the office of the Company at least 14 days previously to the date of election.

Notice is hereby also given, that the Directors will, under the authority of the Company's Act, 1869, 32 & 33 Vict., cap. 130, secs. 6 and 9, submit a resolution to the Proprietors for the purpose of raising £62,500 by the issue of Debenture Stock.

The Transfer Books will be closed from the 24th of March until after the Meeting.

By order,

GEORGE LIVESEY, Secretary and Engineer.

March 13, 1879.

IMPERIAL CONTINENTAL GAS ASSOCIATION BILL.

An EXTRAORDINARY MEETING of the PROPRIETORS of the Imperial Continental Gas Association was held at the City Terminus Hotel, Cannon Street, in the City of London, on THURSDAY, the 13th inst., for the purpose of considering the provisions of the Bill now before Parliament, intituled "A Bill for Empowering the Imperial Continental Gas Association to supply means of Lighting other than Gas, and for other purposes."

SIR JULIAN GOLDSMID, Bart., M.P., Chairman,

When the following resolutions were passed:—

Moved by John Richardson, Esq., seconded by Col. Henry Hume, C.B., and resolved unanimously—

"That this meeting approves of the Imperial Continental Gas Association Bill now before Parliament, subject to any alterations which, with the concurrence of the Directors, may be made in the Bill in its progress through Parliament."

Resolved unanimously—"That a cordial vote of thanks be given to the Chairman for his conduct in the chair this day."

Dated this 14th day of March, 1879.

ALBERT F. JACKSON, Secretary.

By order of the Board.

Prices, half bound, cloth sides, 2 quires, 30s.; 3 quires, 36s.; other sizes and bindings to order.

THE

GAS COMPANIES EXPENDITURE JOURNAL,

Being a Ruled Account-Book with Printed Headings, and Analyzing Guide for Keeping, upon the easiest and most correct method, the Expenditure of a Gas Company, in accordance with the provisions of the Gas-Works Clauses Act of 1871, and suitable for all Companies.

Specimen, with illustration and full particulars; 2s. 6d. returned on the purchase of a "Journal."

Published by EDWARD SANDELL, Accountant, 2, Great George Street, WESTMINSTER, and W. KING, Office of the JOURNAL OF GAS LIGHTING, 11, Bell Court, FLEET STREET, E.C.

CHARD GAS AND COKE COMPANY, LIMITED.

THE Directors of the above Company are prepared to receive TENDERS for LEASE of their Works for a term of 10 or 14 years.

Endorsed tenders to be delivered on or before the 2nd of April.

The Directors do not pledge themselves to accept the highest or any tender.

Particulars may be obtained of Mr. J. Catford, Secretary.

WINDSOR ROYAL GASLIGHT COMPANY.

THE Directors of this Company are pre- pared to receive TENDERS for the Supply and Erection of a Cast-Iron TANK and Telescopic GASHOLDER-75 ft. 2 in. diameter and 18 ft. deep, with the necessary Excavations, Brickwork, &c.

Drawings and specification may be seen, and further information obtained, upon application to the Company's Engineer, at the Gas-Works, Windsor.

Sealed tenders, endorsed "Tender for Gasholder," and addressed to the undersigned, to be sent not later than Monday, March 31, 1879.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
George Cartland, Secretary.
Victoria Street, Windsor, March, 1879.

TO IRONFOUNDERS.

THE Water-Works Committee of the Heywood Local Board invite TENDERS for the Supply of Turned and Bored IRON PIPES, as follows:—

2000	Yards	12 inches.
1000	„	10 „
1500	„	8 „
1000	„	6 „
1000	„	4 „

Specifications may be seen and further information obtained on application to Mr. James Diggle, Water-Works Manager, Miller Street, Heywood.

Tenders to be sent in addressed to the Chairman, and endorsed "Tender for Pipes," not later than 6 p.m. on Monday, the 17th of March next.

The Committee do not bind themselves to accept the lowest or any tender.

Jno. Banks, Clerk to the Local Board.
Office of the Local Board, Heywood,
Feb. 28, 1879.

GAS COAL.

THE MIRFIELD COAL COMPANY are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 12,600 *cubic feet of 16·67 candle gas, with 1430 lbs. of good Coke, per ton.* Ash in Coke, 1·88.

Apply to the Mirfield Colliery, Mirfield, Normanton.

PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For particulars, price &c., apply to Mr. E. Price, Inventor and Patentee, Gas-Works, Hamptor Wick, Middlesex.

Prices are Reduced.

BRAY'S
NEW BURNERS.
40, 50, 60, 70, and 80
CANDLE POWER.

See Page 413.

STOCK OF THE BRISTOL UNITED GASLIGHT COMPANY.

MESSRS. H. R. FARGUS & CO. will SELL by AUCTION, in pursuance and under the provisions of the Bristol United Gas Company's Act. 1873, at their Saleroom, 4, Clare Street, in the City of Bristol, on Thursday, March 20, 1879, at Two o'clock precisely, £20,000 CAPITAL STOCK, issued by them under the authority of the above-named Act.

The Stock will be Sold in Lots of £100 each.

For Conditions of Sale, and any further particulars, apply to the Auctioneers, Clare Street, Bristol; to the Secretary of the Company, Canons Marsh, Bristol; or to Messrs. Brittan, Livett, Box, and Co., Solicitors, Albion Chambers, Bristol.

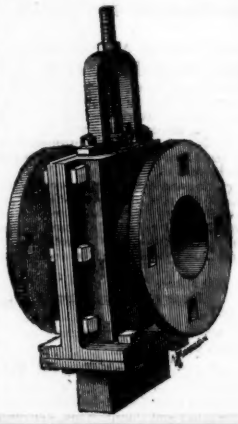
JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
Depôt for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

Now ready, Second Edition, price 7s., by post 7s. 3d., the

GAS MANAGER'S HANDBOOK.
By THOMAS NEWBIGGING, M.I.C.E.

Orders to be sent to
WALTER KING,
11, BOLT COURT, FLEET STREET, LONDON, E.C.

PATENT
MACHINE-MADE RETORTS.
B. GIBBONS, Jun.,
STOURBRIDGE.



IMPROVED
BRIDGE VALVES
For Regulating the Seal of Hydraulic Mains in Gas-Works.

These Valves are so arranged that, when once adjusted for the proper overflow, they can be closed entirely and opened again *without* altering the adjustment.

B. DONKIN & Co.,
Manufacturers of Gas-Exhausting Machinery, &c.,
BERMONDSEY, LONDON, S.E.

ECONOMY IN THE PRODUCTION OF GAS.
PLUTONIC CEMENT,
For Jointing and Repairing Retorts and Ovens *in* Action and *out* of Action.
A Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,
WILLIAM RICHARDSON, Gas and Hydraulic Engineer, CHARLES HENRY STREET, and BISSELL STREET, BIRMINGHAM.

Now Ready, Price One Guinea,

PRECEDENTS IN PRIVATE BILL LEGISLATION
AFFECTING GAS AND WATER UNDERTAKINGS.

Compiled by Mr. G. W. STEVENSON, C.E., F.G.S.

This Work contains information with regard to the practice of Parliament during the last fourteen years, in regard to most of the points on which differences arise in Opposed Bills for Gas and Water Undertakings, comprising—Authorized share and loan capital, Rates of dividend, Capitalization of profits, Term for the repayment of loans, Instances in which new shares are to be sold by auction and Exceptions to the Standing Order requiring new shares to be sold by auction, The limitation of back dividends, Illuminating power, Purity, Price, Notice before testing, The conditions under which the public supply of gas is regulated, Alteration of mains, Instances in which maps of mains are required, and All cases in which undertakings have been transferred, since 1845 in gas and 1865 in water, from Companies to Local Authorities.

In the Water Precedents will be found, in addition, The rates for a supply for domestic purposes, and the Rates for other than domestic purposes.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

J. & H. ROBUS,

BUILDERS AND CONTRACTORS

FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,

RETORT-SETTING—A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

ESTIMATES GIVEN FOR MAIN-LAYING.

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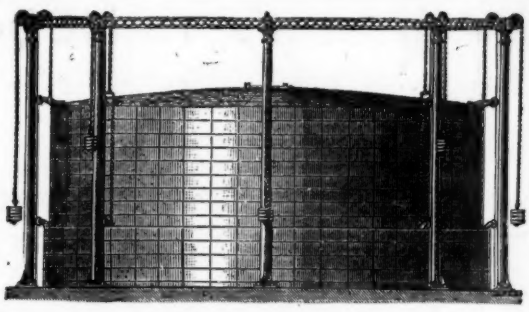


J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

TO INVESTORS IN STOCKS AND SHARES.

MESSRS. WRENN & Co., Brokers, Financial Agents, Auctioneers, &c., will be happy to negotiate for the Sale or Purchase of Gas, Docks, Water-Works, Canal and other securities on moderate terms. Periodical Sales by Public Auction, where equitable prices can be ensured. Holders of Local Provincial Gas and Water Shares are respectfully solicited to communicate with the above at their offices, 4, Copthall Chambers, LOTHBURY.

THE HYDRAULIC MAIN ENTIRELY SUPERSEDED.

AN increased yield of gas, and of augmented illuminating power, is obtained by employing WHITE'S AUTOMATIC VALVE, and dispensing with the Hydraulic Main, the tar of which, as is well known, absorbs the rich constituents of the gas consequently, diminishes alike the quantity and quality.

Further particulars, &c., upon application to WILLIAM WHITE, Gas-Works, Aberaychan, MON.

A Pamphlet descriptive of the above method, post free, 6½d.

Price 28s., handsomely bound in Morocco, cloth sides, gilt edged and lettered.

THE FIRST VOLUME

OF

KING'S TREATISE

On the Science and Practice of the Manufacture and Distribution of

COAL GAS.

Edited by THOS. NEWBIGGING, C.E., M.Inst.C.E., and W. T. FEWTRELL, F.C.S.

Orders received by WALTER KING, 11, Bolt Court, Fleet Street, London, E.C.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & Co., GHENT, will receive immediate attention.

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

GOLDSMITH'S PATENT SIGHT WATER-LINE INDICATING GAS-METER

MANUFACTURED BY GUEST AND CHRIMES,

FOUNDRY AND GENERAL BRASS WORKS,

ROTHERHAM;

AND 85, SOUTHWARK ST., LONDON, S.E.

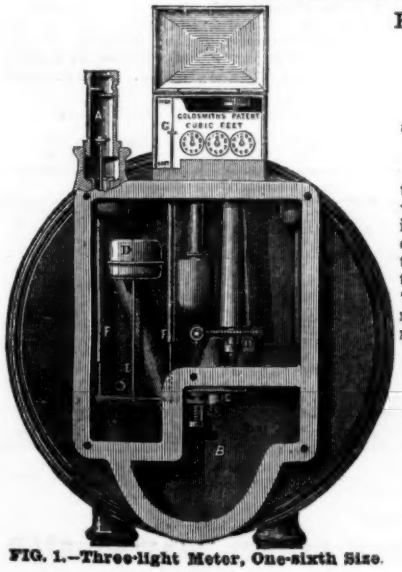


FIG. 1.—Three-light Meter, One-sixth Size.

Fig. 1 is a Meter with front removed to show the arrangement and connection of the Indicator and Valve.

Fig. 2 is front view of Index, with cover up.

The principal object of this invention is to render the water-line in the reservoir at all times visible. It will be seen, by reference to the illustrations, that this is accomplished in the following manner:—On the dial are the words "Open" and "Shut," and attached to the float is the pointer G, which rises and falls with the water-line in the reservoir. If the pointer is at "Open," it shows that the valve is open, and that the reservoir is full. If it is at "Shut," it shows that the reservoir is empty, and that the gas will be shut off.

The following ADVANTAGES will be obvious:—

1. The Inspector can see at a glance if the Meter requires water.
2. No more water than is required need be added, and therefore no water has to run out.
3. The Meter Inspector will be spared a great deal of his most objectionable work, and he will save a great deal of time and trouble.
4. The consumer will not always have to be asked for water, nor will he have to endure the unpleasant smell caused by waste water being run out.

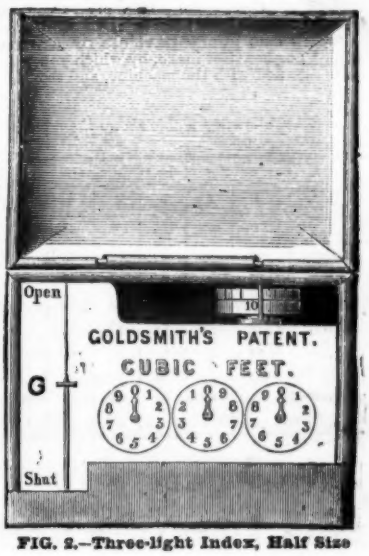
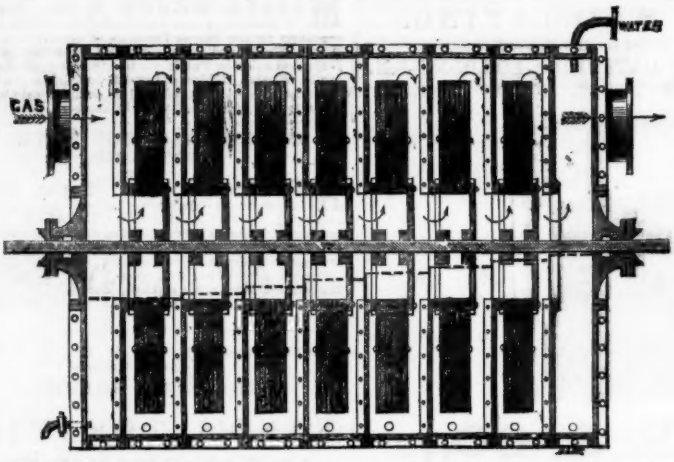


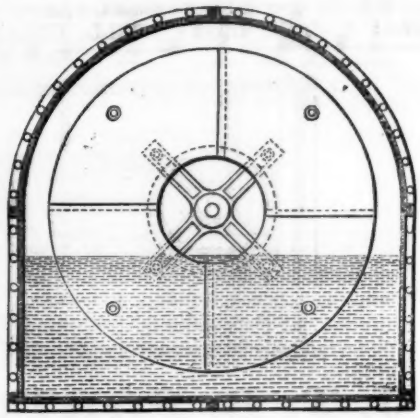
FIG. 2.—Three-light Index, Half Size

THE

"STANDARD" WASHER & SCRUBBER.

[KIRKHAM, HULETT, AND CHANDLER'S PATENT.]





This Washer and Scrubber has been used for nearly two years on a large scale at the Works of The Gaslight and Coke Company, Bromley-by-Bow, at which station there are now several in operation and in course of construction. There is also one in use at the Pancras Station, King's Cross, of the same Company, which is purifying 1,500,000 cubic feet of gas per day. At the Gas-Works of the Corporation of Leeds, a large one has been erected, which is giving complete satisfaction. The Special Merits of this Washer are as follows:—

That it is a very effective Condenser, so that it is not absolutely necessary to reduce the temperature of the gas to 60°, or thereabouts, to make the Washer effective.

That the distribution of the liquor is made with unerring regularity.

That it occupies very small space, so that it can be, at little expense, effectually protected from extreme changes of the weather.

That the considerable expense of Coke or Wood, or other Scrubbing Material, is entirely saved, and that the great nuisance and cost of from time to time replacing the Scrubbing Material is avoided.

That, by the revolution of the discs, the quantity of water carried up by them, and tending continuously to fall, exposes a very large amount of fresh wetted surface to contact with the gas.

That it is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured.

That it is much cheaper than any other Scrubber that will do the same amount of work effectually.

That it is the only Washer suitable for purifying Gas from all its impurities by solution.

That it works with a minimum of pressure.

That it takes out every trace of Ammonia from the Gas in once traversing the machine.

That it requires very little outlay for foundations.

The following Testimonials show the opinion of eminent Engineers as to the capabilities of the Washer:—

(Copy.)

The Gaslight and Coke Company
Bromley-by-Bow, May 3, 1877.

D. HULETT, Esq.

Dear Sir,—In answer to your inquiries respecting the results of the working of your Patent Washer, I beg to state that I find it a very efficient machine. I have had it in operation for some time, and passed gas through it continuously at the rate of 100,000 cubic feet per hour, and obtained from it 11 gallons of 10 oz. liquor per ton of coal carbonized—results which appear to me very satisfactory for so small a Washer. It works very smoothly, taking but little power, and giving no pressure. I have it still in operation, and am perfectly satisfied with its working.

I am, dear Sir, yours truly, (Signed) W. B. WRIGHT.

(Copy.)

The Leeds Corporation Gas-Works,
York Street, Leeds, Dec. 6, 1878.

Messrs. KIRKHAM, HULETT, and CHANDLER.

Gentlemen,—The Scrubber-Washer erected by you at these works, and which has been in use for six months, has proved to be, so far as we have been able to test it, thoroughly efficient. We are at present making 32,000 feet of gas per hour, and are entirely dependent on this apparatus for the removal of Ammonia, and the **Gas is perfectly free from that impurity in the sixth chamber,** so that four chambers remain to deal with an increasing make of gas. Owing to insufficient condensers, the gas was in the summer admitted to the Scrubber at a temperature of 70°, but was reduced therein to 61°, or that of the atmosphere. The volutes are driven at the rate of four revolutions per minute, and, working at that speed, there is not the slightest difference between the inlet and the outlet pressure. Clean water supplied at the rate of 10 gallons per ton of coal carbonized is converted into liquor of from 10 oz. to 13 oz. strength **in once traversing the vessel.** The apparatus is extremely simple and compact, occupies but little space, and requires no foundation. I shall be surprised if it does not eventually become extremely popular.

I am, Gentlemen, yours faithfully, (Signed) HENRY WOODALL, Engineer.

(Copy.)

The Gaslight and Coke Company.
York Road, King's Cross, Jan. 14, 1879.

Messrs. KIRKHAM, HULETT, and CHANDLER.

Gentlemen,—In reply to your inquiry, I am pleased to say, the Washer which was put in action at this station in October last has quite fulfilled my expectations, as it confirms the experiments I made in May last with the smaller machine. Working at four revolutions per minute, **it takes out every particle of Ammonia,** while purifying more Gas than it was intended to do. I enclose particulars of a fortnight's working during our heaviest make, by which you will see that it yields the full quantity and strength of liquor, and works with little pressure. I am therefore quite satisfied with the machine, and trust it may meet with the success it deserves.

I remain, Gentlemen, yours truly, (Signed) JOHN CLARK.

The following Table shows the results of the working of one of these Washers, lately erected to purify 60,000 *feet of Gas per Hour, at the St. Pancras Station of The Gaslight and Coke Company:—*

1879.	Nos. of the Divisions and Strength of Liquor in each.										Water used per Ton of Coals.	Gas Purified per Hour, Cubic Feet.	Ammonia on Outlet.	Temperature.			Pressures.		Revolutions per Minute.
	1	2	3	4	5	6	7	8	9	10				Inlet.	Outlet.	Atmosphere.	Inlet, Inches.	Outlet, Inches.	
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.									
January 1	8¼	6⅝	5	3¼	2½	1⅝	⅝	¼	0	0	10 Gallons.	52,000	Nil.	77°	73°	48°	24	23	7½
,, 2	8⅝	7	6	4⅛	3¼	2½	1⅛	⅝	⅛	0	10 ,,	57,000	Nil.	73°	66°	32°	21⅞	20⅝	4
,, 3	9¼	8	6	3⅝	3	2⅛	1⅛	⅜	⅛	0	10 ,,	60,000	Nil.	75°	63°	40°	23½	22	4
,, 4	9¼	7⅜	6¼	4¼	3¼	2⅛	1⅛	⅜	⅛	0	10 ,,	65,000	Nil.	74°	68°	33°	24	22½	5
,, 5	9⅝	7	6	4	3	2⅛	1¼	1	⅛	0	10 ,,	34,000	Nil.	77°	68°	35°	14½	14	5
,, 6	9¼	7⅛	6¼	4¼	3	2¼	1⅛	1	⅛	0	10 ,,	63,000	Nil.	72°	66°	27°	24	22½	4½
,, 7	11	9	7	5⅛	3⅜	3	1⅜	1⅛	⅛	0	10 ,,	59,000	Nil.	74°	66°	31°	25	23½	5
,, 8	9¼	7⅜	6	4⅜	3	2	1	⅝	⅛	0	10 ,,	78,000	Nil.	73°	61°	31°	28	26¼	4½
,, 9	11	9	7	5	3⅜	2⅛	1⅛	1	⅛	0	10 ,,	82,000	Nil.	74°	67°	33°	27½	25½	5
,, 10	10⅜	8⅛	6⅜	5	3⅛	2⅛	1⅛	1	⅛	0	10 ,,	66,000	Nil.	76°	64°	28°	28½	27	5
,, 11	12⅛	10	7⅜	5⅛	4⅛	3⅛	1⅜	1⅛	⅛	0	10 ,,	61,000	Nil.	78°	64°	27°	26½	25½	5
,, 12	11	8⅞	6⅜	—	—	—	1¼	⅝	⅛	0	10 ,,	39,000	Nil.	74°	64°	27°	26½	25½	5
,, 13	13	10⅜	8¼	6	4⅛	3⅛	2	1⅛	⅛	0	10 ,,	78,000	Nil.	73°	65°	42°	28	26	5

(Signed) JOHN CLARK, Engineer.

For further particulars and testimonials, address

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER.

BRAY'S

"STANDARD"

FLAT-FLAME BURNERS.

(PATENT SLIT UNIONS.)

LIGHTING POWER—40, 50, 60, 70, and 80 CANDLES.

In consequence of the demand for Burners of extra Power for Lighting Large Spaces, we have introduced Burners of the above lighting power, which give from TWELVE to TWENTY per Cent. more light per cubic foot of gas consumed than any Flat-Flame Burner hitherto introduced.

Photometrically, with 16-candle gas, our New Standard Burners yield a result equal to the best Argands of similar consuming power; while, *in actual use*, we are prepared to demonstrate a yield of light 20 per cent. *superior* to the best Argands. With 20-candle gas and upwards, the *photometrical* superiority is greatly in favour of our New Burners.

FOR STREET-LAMP PURPOSES there is no liability of the lamps being filled with carbon by a governor getting out of order, as will be the case where Argands are used; and, as they are lighted in the ordinary way, there is no necessity to keep a small jet burning all day in order to light the Burner at night.

GEORGE BRAY & CO.'S

"ENAMEL" GAS-BURNER WORKS,

BLACKMAN LANE,

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AMMONIACAL LIQUOR.

SPENCE and STEUART, Frizinghall, near Shipley, YORKSHIRE, are Purchasers of above.

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W. HAILES Contracts for the Erection of Retort Benches, Settings of Retorts on all the most improved principles, in large or small works. Twenty years experience both in London and Provinces. Price List on application.
Address 3, High Street, Brentford, MIDDLESEX.

HENRY LYON (14 years Engineer and Manager of the largest of the Manchester Corporation Gas-Works) Mechanical and Consulting Gas Engineer, reports upon the condition and value of Gas-Works, supplies plans and specifications of all Apparatus appertaining to Gas-Works, and re-models existing Works.
Address Brooklyn, near Halliwell Lane, Cheetham Hill Road, MANCHESTER.

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Public Accountant,
MOORGATE STREET CHAMBERS,
GREAT SWAN ALLEY,
MOORGATE STREET, E.C.

Mr. ROBERT DEMPSTER,
CONSULTING GAS ENGINEER,
ELLAND, near HALIFAX,
May be consulted on all matters connected with Valuations, Arbitrations, and Parliamentary Applications connected with Gas-Works. Having been engaged on extensive Arbitration Cases, which, combined with his experience in Construction and Contracting, his knowledge of Engineering and Valuations is both extensive and reliable.

ALFRED LASS,
SPECIAL ACCOUNTANT FOR GAS COMPANIES,
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Accounts analysed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.
The Forms of Account, which have been specially designed to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.
The above forms are registered.
Water Companies Accounts also prepared and adjusted.
CONSULTATIONS.

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PATENT COKE AND COAL BARROW
Is acknowledged to be the best Barrow in the Market.
For particulars, with Drawings and Prices, apply to the Sole Makers,
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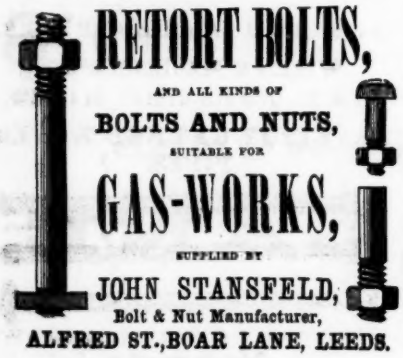
ENGINEERS AND CONTRACTORS,
57, BARBICAN, LONDON, E.C.

SCOTCH CANNEL COALS.
The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.
JAMES M'KELVIE,
CANNEL COAL MERCHANT,
HAYMARKET, EDINBURGH.
Established 1840.

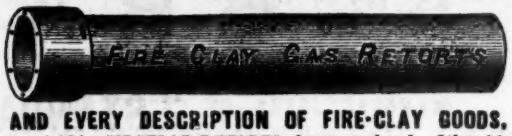
CLOTH GAS-BAGS FOR MAINS,

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber, and Gutta-Percha Machine-Bands, Sheet and Washers, and Steam Joints.
T. BUGDEN, Manufacturer,
107, GOSWELL ROAD, LONDON, E.C.



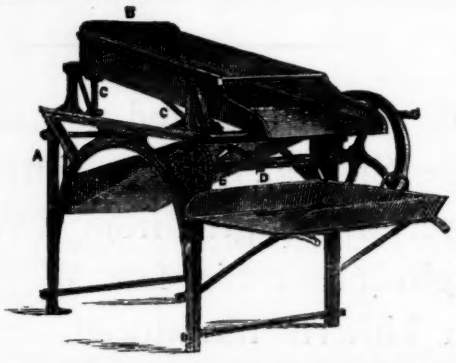
RETORT BOLTS,
AND ALL KINDS OF
BOLTS AND NUTS,
SUITABLE FOR
GAS-WORKS,
SUPPLIED BY
JOHN STANSFELD,
Bolt & Nut Manufacturer,
ALFRED ST., BOAR LANE, LEEDS.

JOHN HALL AND CO., STOURBRIDGE,
Manufacturers of FIRE-BRICKS, LUMPS, TILES,



AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

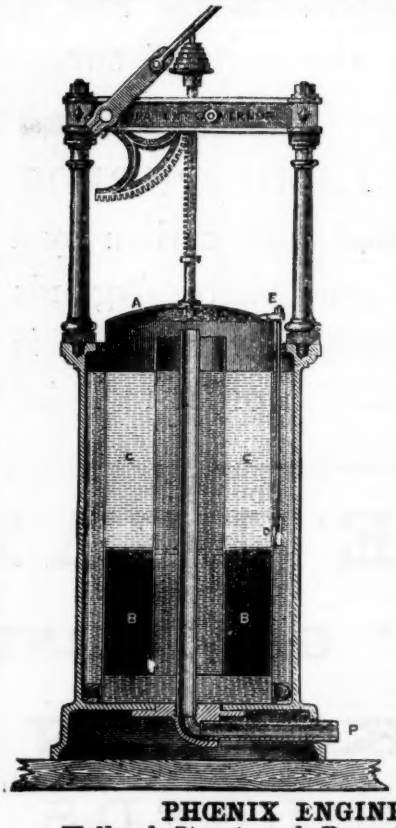
BEST GAS COALS
DIRECT FROM THE
MARQUESS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
For Prices and Particulars, apply to
MR. S. J. DITCHFIELD,
LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.



PRICE'S PATENT
LABOUR-SAVING SCREEN OR SIFTER.

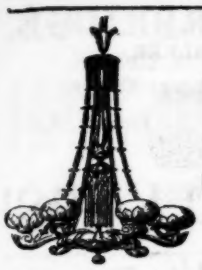
In screening breeze, the coarse material falls on a tray supported by the handles of the Machine, thus making it convenient for picking the clinkers from the same, whilst the fine falls on a shoot behind, which is fixed to the bottom of the sieve B. In screening gravel or other material, the coarse will fall into a barrow direct, and the fine be conveyed by the shoot into a barrow at the other end, or at the bottom.
To practical men the advantages of this Machine will be evident. It secures at once a saving of time, labour, and expense, as by it a much greater quantity of material can be sifted in the same space of time.
Further particulars as to price, &c., may be obtained by applying to the Patentee (Hampton Wick), or to
ROBERT DEMPSTER & SONS,
(SOLE MANUFACTURERS),
ELLAND, NEAR HALIFAX.

GEORGE WALLER & CO.,
GAS AND HYDRAULIC ENGINEERS,
Patent Compensating Steam Governor,
WITH SELF-CONTAINED WATER-BALANCE.



DESCRIPTION OF THE APPARATUS.
The illustration represents a section of the Patent Governor. The lower part of the Bell A is fitted with a loose Float B, and in the upper part of the Bell is a deep annular Water Chamber C, at the bottom of which is an opening D, with a slide outside regulated by a Screw Spindle E, to allow the water to pass in and out of the Chamber C quickly or slowly, according to circumstances, but when once adjusted the slide does **not require altering.** This Self-compensating Chamber gives great steadiness to the up and down movement of the Bell and effectively prevents the "hunting" motion so common with other Governors, thereby ensuring a more perfect action on the throttle-valve of the Engine **than attained by any other.** The sketch shows the clip lever fixed to work on throttle-valve at an angle, and can work in either direction. P is the Gas Inlet-pipe to Governor.
G. W. & Co. also make **special Steam Throttle Valves,** suitable for working with this Governor, and alter existing Throttle Valves to same plan.

PHŒNIX ENGINEERING WORKS,
Holland Street and Bear Gardens, Southwark, S.E.



F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

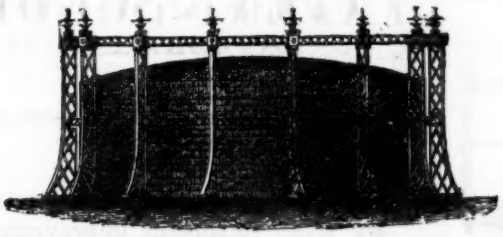
ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS.

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

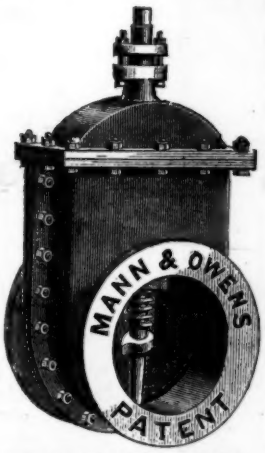
ALSO

MAKERS OF ROOFS, BRIDGES, &c.

MANN & OWENS' PATENT GAS-VALVE.

VALVE, with Indicator or Above Ground.

EVERY VALVE WARRANTED TO BE PERFECTLY SOUND AND GAS-TIGHT.



UNDERGROUND VALVE.

The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.

The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.

The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.

SOLE MANUFACTURERS:

S. OWENS AND CO.,

HYDRAULIC AND GENERAL ENGINEERS,

WHITEFRIARS STREET, LONDON, E.C.

PRICES, SIZES, AND FULL PARTICULARS ON APPLICATION.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,

COTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.

Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

BIRTLEY IRON WORKS,

CHESTER-LE-STREET, DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Keep in London and at their works large stocks of PIPES and CONNEXIONS (1½ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

CHARLES HORSLEY, Agent.

THE

SILICA FIRE-BRICK CO.,

OUGHTIBRIDGE

Near SHEFFIELD,

Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

PORTBURY, PATERSON, & CO.,

MANUFACTURERS OF

Improved Wet and Dry Gas-Meters,

ALSO PATENTEES OF

COMPENSATING WET METERS;

INDICATORS,

STATION AND TEST METERS TO ORDER

STREET-LAMPS AND FITTINGS.

WORKS: WATERBEER ST., EXETER.

TROTTER, HAINES, & CORBETT,

BRETTELL'S ESTATE

FIRE CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.

Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.

Successors to

E. BAKER AND CO., LATE BRIERLEY HILL, STAFFORDSHIRE.

HARPER & MOORES,

PROPRIETORS OF THE

BEST STOURBRIDGE CLAYS,

STOURBRIDGE.

Manufacturers of all Descriptions of

BEST STOURBRIDGE FIRE-BRICKS, LUMPS AND CLAY RETORTS

Of all Dimensions for Gas-Works,

GLASS-HOUSE POTS & CRUCIBLES

ESTABLISHED 1836.

The Highest Award was obtained by H. & M., at the Philadelphia Exhibition, 1876, for Superior Quality of Manufacture. SILVER MEDAL, PARIS, 1878.

GAS AND WATER PIPES.

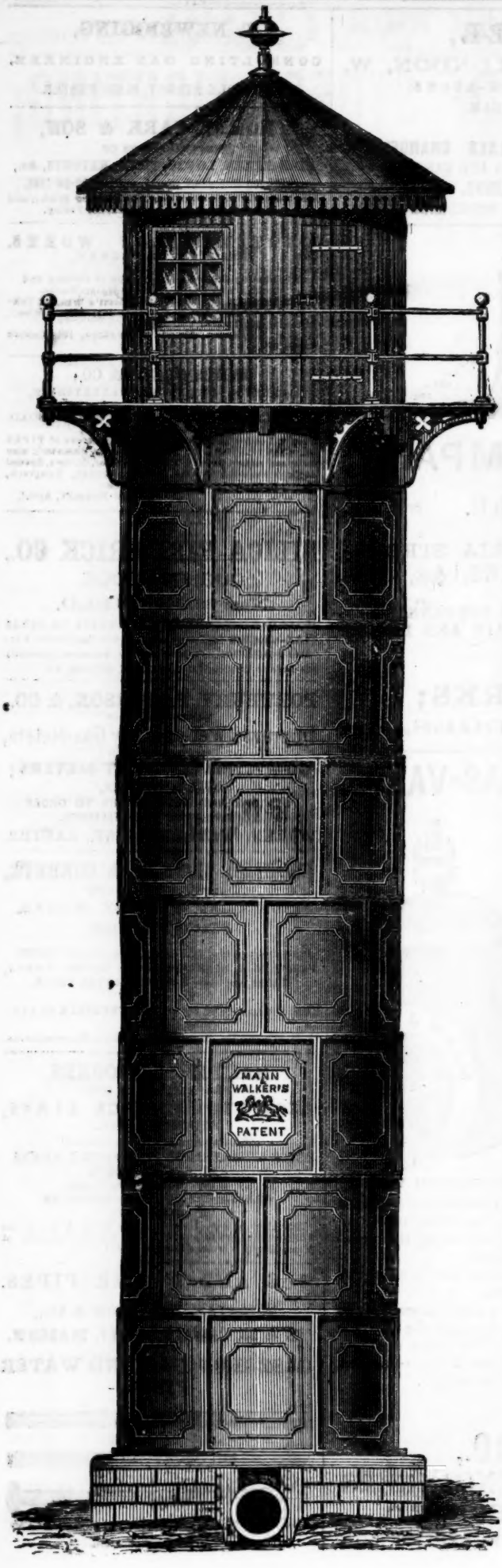
WILLIAM MACLEOD & CO.,

23 & 25, OSWALD STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.

DELIVERY F.O.B., GLASGOW

Prices on application.



C. & W. WALKER,
8, Finsbury Circus,
London, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

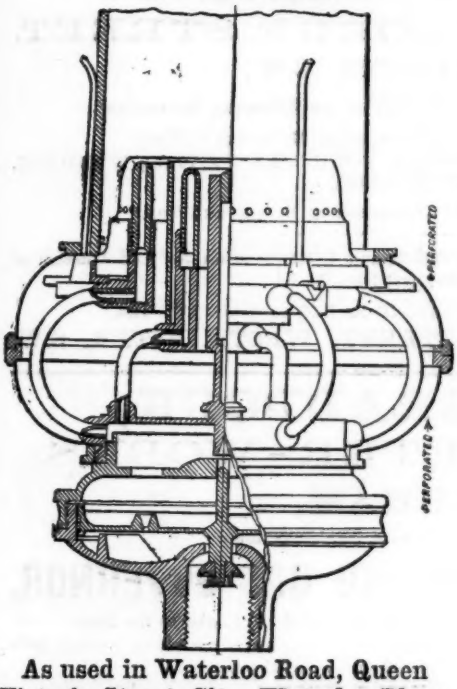
They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. and W. Walker, 8, Finsbury Circus, London, E.C., or to Mr. William Mann, late Superintendent of the Chartered Gas-Works, Blackfriars, London; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

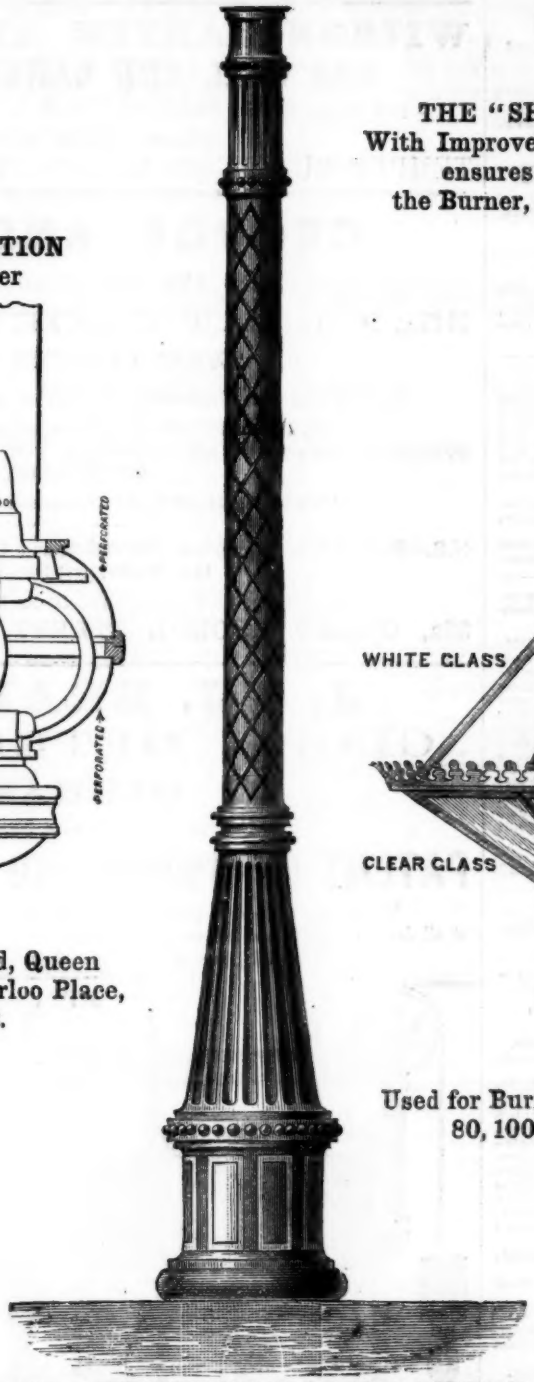
WILLIAM SUGG'S
IMPROVED SYSTEM OF STREET LIGHTING,

SUITABLE FOR EITHER CANNEL OR COMMON GAS.

SECTIONAL ELEVATION
of 80-candle Burner

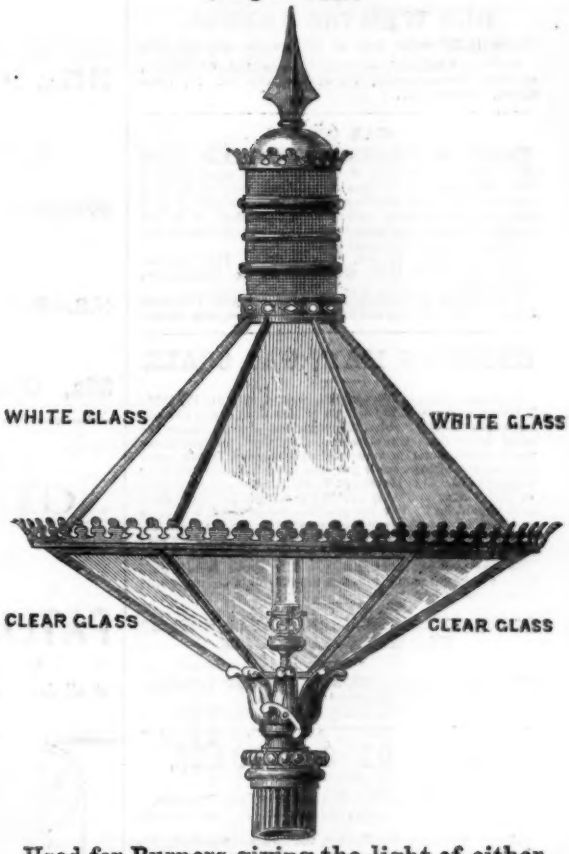


As used in Waterloo Road, Queen Victoria Street, City, Waterloo Place, and Regent Street.



THE "WESTMINSTER" LAMP-COLUMN,
Of Improved construction,
8 feet and 9 feet from ground to top of Column.

THE "SHADOWLESS" LANTERN,
With Improved System of Ventilation, which ensures steadiness of the flame of the Burner, even in very windy weather.
(Registered.)



Used for Burners giving the light of either 80, 100, 150, or 200 Spermaceti Candles.

Other Patterns of Lanterns and Columns are in course of construction, and will be shortly Published in this JOURNAL.

WILLIAM SUGG,
GAS ENGINEER,
VINCENT WORKS, VINCENT STREET, WESTMINSTER, S.W.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

HARTHILL CANNEL

Yields 14,920 cubic feet of 40·92-candle gas per ton.

THRASHBUSH CANNEL

12,580 cubic feet of 40·22-candle gas per ton, and 9 cwts. of good coke.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 3 per cent. of ash. This cannel is almost free from sulphur.

OLD WEMYSS CANNEL

Yields 13,390 cubic feet of 32·5-candle gas per ton.

Prices and full analyses on application at above address, or from WEDDERSPOON, FERGUSSON AND CO., 21, Lime Street, LONDON, E.C.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9666 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

PRICES ON APPLICATION, EITHER F.O.B. OR BY RAIL IN TRUCK LOADS.

THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
29, QUAYSIDE, NEWCASTLE-ON-TYNE.

HOLMSIDE GAS COALS.

South Metropolitan Gaslight and Coke Company, 589, Old Kent Road, London, S.E., Oct. 9, 1873.

At the request of Mr. Hedley, the owner of the Holmside Colliery, I have much pleasure in stating that, for about ten or twelve years past, this Company has taken at least half of its supply of Newcastle Coal from him. I can, therefore, confidently bear testimony to the good quality of the Holmside Coals, and consider they are equal to the best of the Newcastle Coals, in proof of which I may state that this year we are using those Coals exclusively, that the yield of Gas is from 9700 to 9800 feet per ton, and that the quality of the Gas, without any admixture of Cannel, is over 16 candles, as tested by the officer appointed by the Metropolitan Board of Works, using the London Gas Referees test.

The Coke is of excellent quality, and in quantity amounts to about 40 bushels from a ton of Coal.

The annual consumption of Coal amounts to about 75,000 tons.

GEORGE LIVESEY, Engineer and Secretary.

P.S.—I am at this date, Feb. 15, 1875, still using Holmside Coals as largely as ever, and am quite as well pleased with them as when I gave the above certificate.

GEORGE LIVESEY.

We are this year, 1878, using 80,000 tons of Holmside Coal. GEORGE LIVESEY.

FITTING OFFICE:
Address, 75, QUAYSIDE, NEWCASTLE-ON-TYNE.

M. BREMOND'S NAPHTHALINE PROCESS.

All negotiations respecting M. Brémond's patented process for preventing Deposits of

NAPHTHALINE

in Gas Main and Service Pipes should be addressed to Mr. W. H. BENNETT, 22, Great George Street, WESTMINSTER, S.W., or to M. BREMOND, Gas Engineer, Compania Madrilena de Alumbrado y Calefaccion por Gas, MADRID, who may be consulted upon all matters connected with the Gas Industry.

FERRAND DAVIES,

148 GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,
AGENT FOR
THOMAS BARR'S LESMAHAGOW MAIN CANNEL,
AND
NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON,
GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

Address—CHIEF OFFICES:
TEMPLE BUILDINGS, 50, NEW STREET, BIRMINGHAM.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,
WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Invention

RETORT SETTINGS—giving great Economy of Fuel.
STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

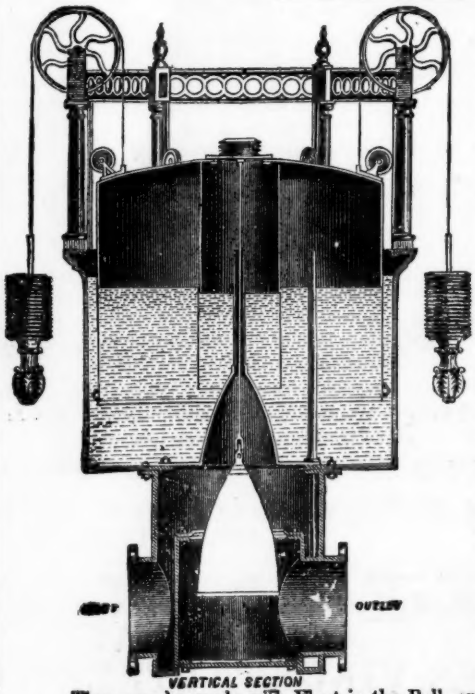
PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,
35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

J. & J. BRADDOCK,
GLOBE METER-WORKS,
OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

SULPHATE AMMONIA.

R. W. WALLACE & CO.,

60, MARK LANE, LONDON, E.C.,

Are Buyers of SULPHATE AMMONIA in Large or Small Quantities, or Sell on Commission for Gas Companies and Makers.

PLANT ERECTED ON THE LATEST AND MOST APPROVED PRINCIPLE.

AGENTS to THE GASLIGHT AND COKE COMPANY, LONDON, for the SALE of SULPHATE AMMONIA. Works: BECKTON.

PARIS EXHIBITION, 1878.

THREE MEDALS
AND
HONOURABLE MENTION
HAVE BEEN AWARDED TO
JOSEPH CLIFF & SONS
For their Various Exhibits, amongst which is a
SILVER MEDAL
FOR THEIR
PATENT MACHINE-MADE
RETORTS AND FIRE-BRICKS,
Being the Highest Honour given for this class.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL
WORTLEY FIRE-BRICK WORKS,
NEAR LEEDS,
London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,
NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"*Warrington Gaslight and Coke Company,*
Offices, Mersey Street, Warrington, April 23, 1877.

"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly,
"JAMES PATERSON."

Full particulars will be sent on application to us—address as above.

NEW PATENT WET GAS-METER,

THE "RELIANCE,"

MANUFACTURED BY THE

GAS-METER COMPANY, LIMITED

238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON.

ALEXANDER WRIGHT & CO.,

MANUFACTURERS OF

"WET" AND "DRY" GAS-METERS,

STATION-METERS, AND GOVERNORS.

METERS, BOXES, REGULATORS, AND ALL REQUISITES FOR PUBLIC LIGHTING.

TESTING APPARATUS for all purposes relating to Gas, &c.

MR. VERNON HARCOURT'S COLOUR TESTS,

Descriptive particulars, per post, 2d.

55, 55a, & 56, MILLBANK STREET, WESTMINSTER, LONDON, S.W.

R. LAIDLAW AND SON,

EDINBURGH AND GLASGOW.

Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges,
Governors, Test Holders, &c., &c.

LONDON OFFICE:

6, LITTLE BUSH LANE, CANNON STREET, E.C.

IMPROVED HYDRAULIC CRANES,

Effecting a great saving in the cost of discharging Coals from Vessels, Barges, &c. Several of these Cranes, with the necessary power, are now being erected at the Beckton Gas-Works.

DIRECT-ACTING HOISTS

For LIFTING RAILWAY WAGGONS to RETORT-HOUSE STAGEWAY; CAPSTANS for HAULING WAGGONS, &c.,

HYDRAULIC APPARATUS for Lifting and Lowering Purifier-Covers.

Sixteen recently erected at Beckton, applied to Covers 30 feet square.

GAS AND WATER PIPES, ROOFING, BOILERS, &c.

SULPHATE OF AMMONIA APPARATUS,

IN SUCCESSFUL OPERATION AT THE NEW WORKS OF THE NEWCASTLE AND GATESHEAD GAS COMPANY.

For particulars, apply to

JOHN ABBOT & CO., LIMITED,

2, SUFFOLK LANE, CANNON STREET, E.C., or PARK WORKS, GATESHEAD-ON-TYNE.

London: Printed by WALTER KING, for the Executors of the late WILLIAM BOUGHTON KING (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street), and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, March 18, 1879.